US010480223B2

(12) **United States Patent**
Nakasone

(10) **Patent No.: US 10,480,223 B2**
(45) **Date of Patent: Nov. 19, 2019**

(54) **LOCK DEVICE FOR OPENING AND CLOSING BODY**

(71) Applicant: **PIOLAX, INC.**, Yokohama-shi (JP)

(72) Inventor: **Hisashi Nakasone**, Yokohama (JP)

(73) Assignee: **PIOLAX, INC.**, Yokohama-Shi, Kanagawa (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/779,809**

(22) PCT Filed: **Nov. 22, 2016**

(86) PCT No.: **PCT/JP2016/084518**
§ 371 (c)(1),
(2) Date: **May 29, 2018**

(87) PCT Pub. No.: **WO2017/094551**
PCT Pub. Date: **Jun. 8, 2017**

(65) **Prior Publication Data**

US 2018/0340360 A1 Nov. 29, 2018

(30) **Foreign Application Priority Data**

Nov. 30, 2015 (JP) 2015-233730

(51) **Int. Cl.**
E05B 83/30 (2014.01)
E05C 9/04 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***E05B 83/30*** (2013.01); ***E05B 13/10*** (2013.01); ***E05B 85/14*** (2013.01); ***E05C 9/041*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC ... E05B 1/04; E05B 9/04; E05B 13/10; E05B 15/00; E05B 83/00; E05B 83/28;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,048,311 B2 * 5/2006 Sawatani E05B 83/30 292/32
7,455,333 B2 * 11/2008 Ookawara E05B 83/30 292/34
(Continued)

FOREIGN PATENT DOCUMENTS

JP 2009-002143 A 1/2009
JP 2009-215740 A 9/2009
(Continued)

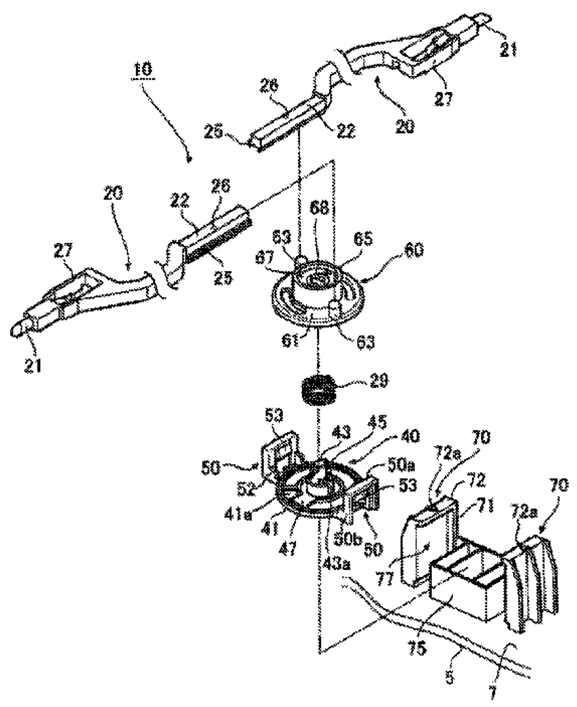
OTHER PUBLICATIONS

International Search Report (ISR) (PCT Form PCT/ISA/210), in PCT/JP2016/084518, dated Jan. 24, 2017 and English translation.
(Continued)

Primary Examiner — Christopher J Boswell
(74) *Attorney, Agent, or Firm* — McGinn I.P. Law Group, PLLC.

(57) **ABSTRACT**

A lock device includes lock portions, a pair of rods, a base member, a rotary member, and a manipulation member. The rotary member has a rod link portion coupled with the rods and transmit rotational power of the rotary member to the rods and a guide wall located inside the rod link portion in the rotary member and guides the rods. The guide wall includes arc walls or a cylindrical wall whose axis coincides with the rotation center of the rotary member. When viewed from a direction perpendicular to a bottom surface of the base member, the erection wall and the guide wall are opposed to each other with a gap. Coming-off-preventive structures for preventing the rod from coming off when the
(Continued)



rod is inserted in the gap and coupled with the rod link portion is provided between the rod and the erection wall.

19 Claims, 15 Drawing Sheets

(51) **Int. Cl.**

E05B 13/10	(2006.01)
E05B 85/14	(2014.01)
E05C 1/14	(2006.01)

(52) **U.S. Cl.**
CPC ***E05C 9/042*** (2013.01); ***E05C 9/043*** (2013.01); *E05C 1/145* (2013.01)

(58) **Field of Classification Search**
CPC . E05B 83/30; E05B 85/14; E05C 9/00; E05C 9/04; E05C 9/043
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,832,239	B2 *	11/2010	Kozuka	E05B 83/30 292/39
8,141,398	B2 *	3/2012	Ookawara	E05B 83/30 292/109
8,590,351	B2 *	11/2013	Ookawara	E05B 83/30 292/163
9,074,389	B2 *	7/2015	Shimizu	E05B 83/30
9,121,206	B2 *	9/2015	Shimizu	E05B 63/14
9,850,691	B2 *	12/2017	Nakasone	E05B 83/30
2008/0290685	A1	11/2008	Ohnuki	
2011/0174027	A1	7/2011	Ookawara et al.	
2011/0309640	A1 *	12/2011	Matsubara	E05B 83/30 292/159
2015/0008680	A1 *	1/2015	Suzuki	E05B 83/30 292/32

FOREIGN PATENT DOCUMENTS

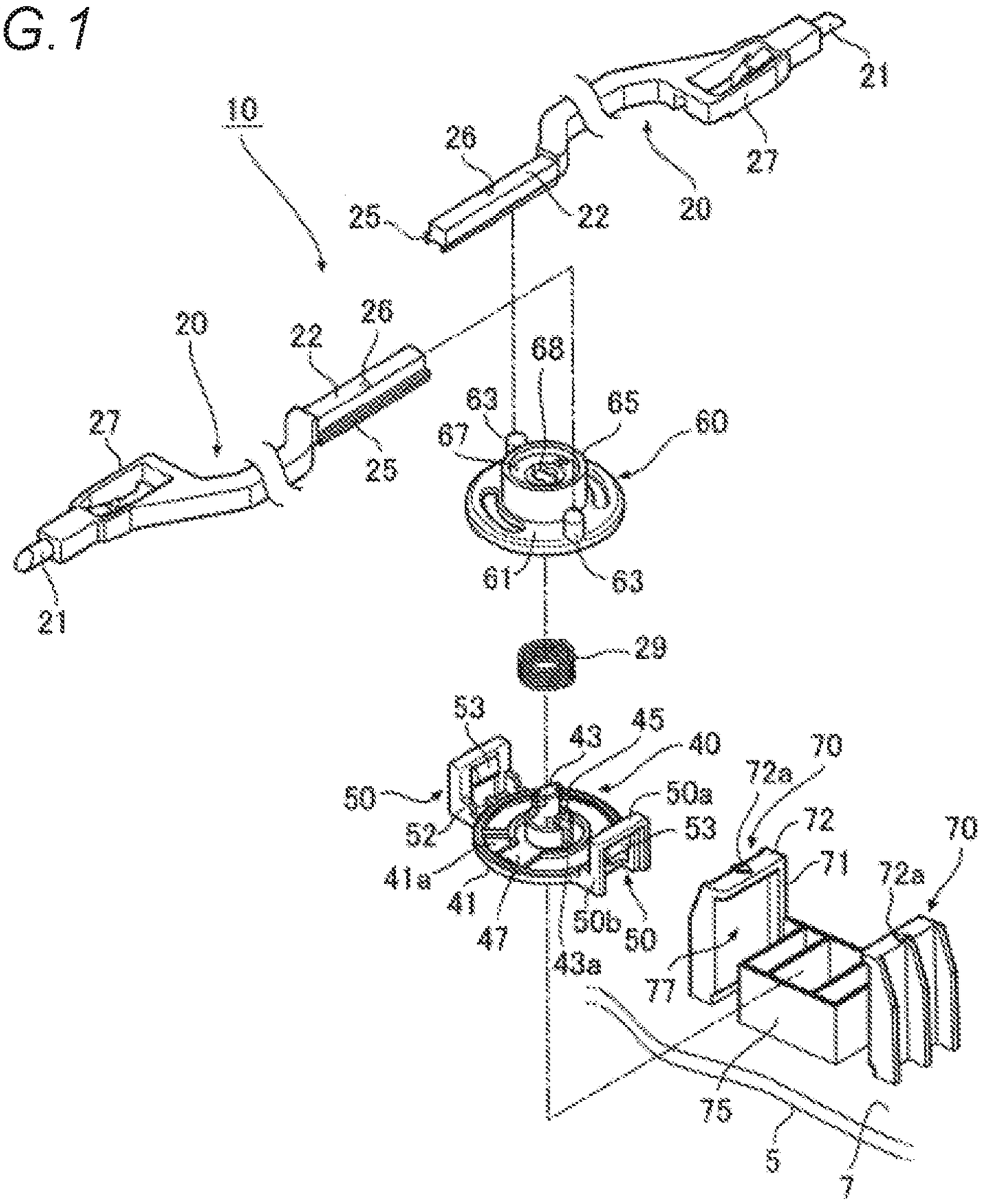
WO	WO 2010/038716 A1	4/2010
WO	WO 2015/125774 A1	8/2015

OTHER PUBLICATIONS

International Search Report (ISR) (PCT Form PCT/ISA/237), in PCT/JP2016/084518, dated Jan. 24, 2017.

* cited by examiner

FIG. 1


10
26
21
27
20
25
22
20
22
26
27
25
68
63
65
67
60
61
63
21
29
53
43
45
40
70
72a
50
50a
52
53
72
70
41a
71
72a
41
50b
50
47
43a
77
75
51
7

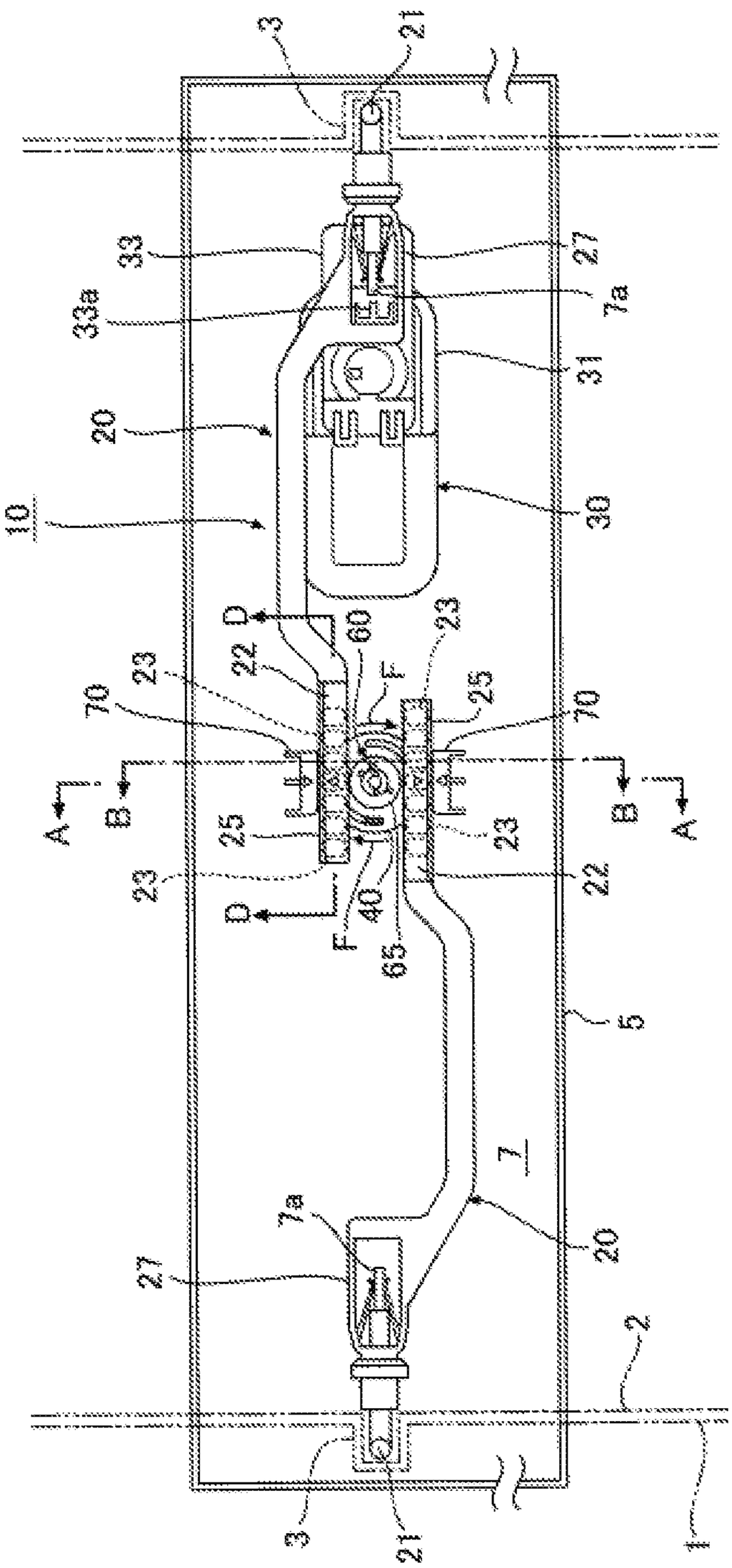

3
21
33
27
33a
7a
31
20
10
30
D
60
23
22
F
25
70
A
B
B
A
23
D
F
40
65
5
7
7a
27
20
2
3
21
1

FIG 2

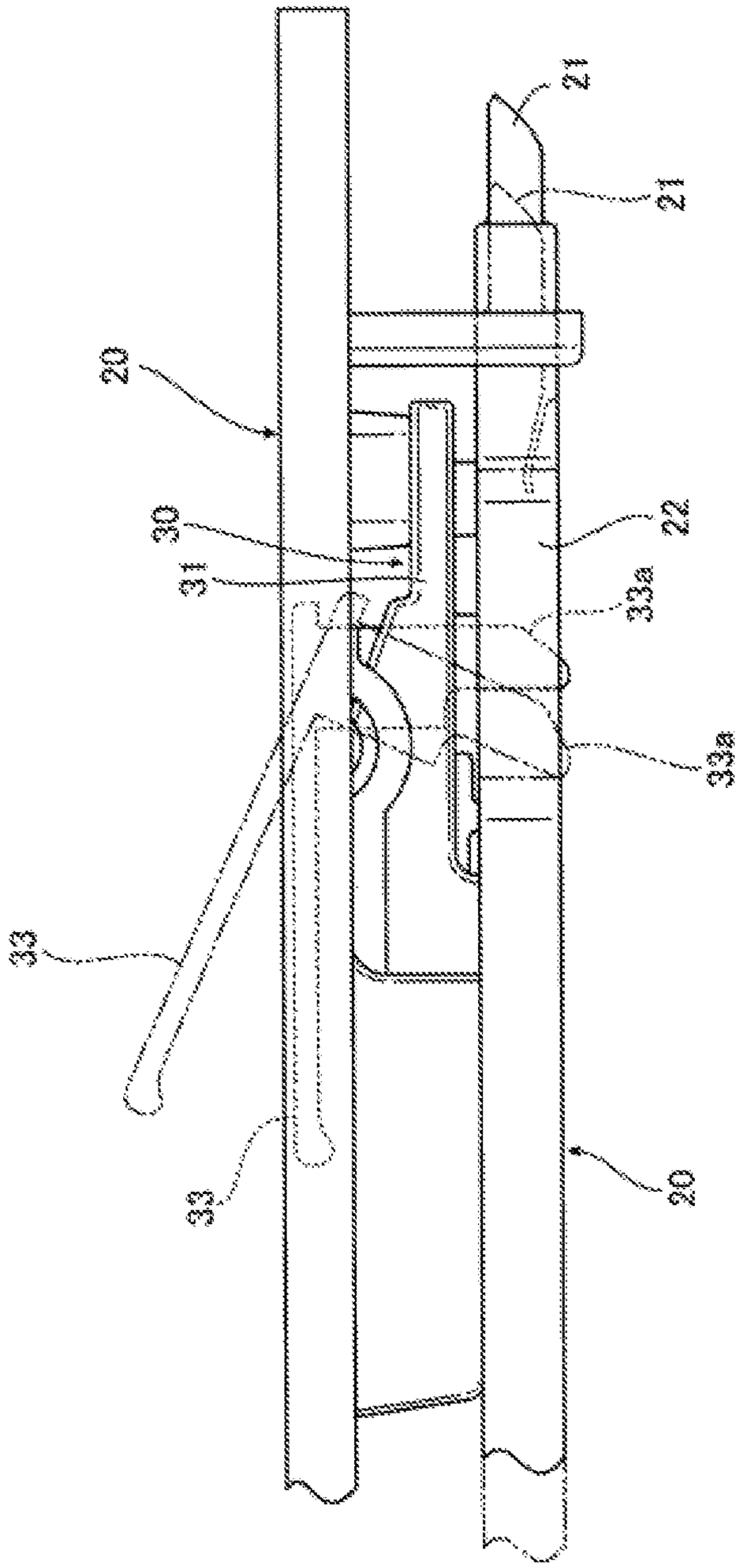


FIG. 3

FIG.4

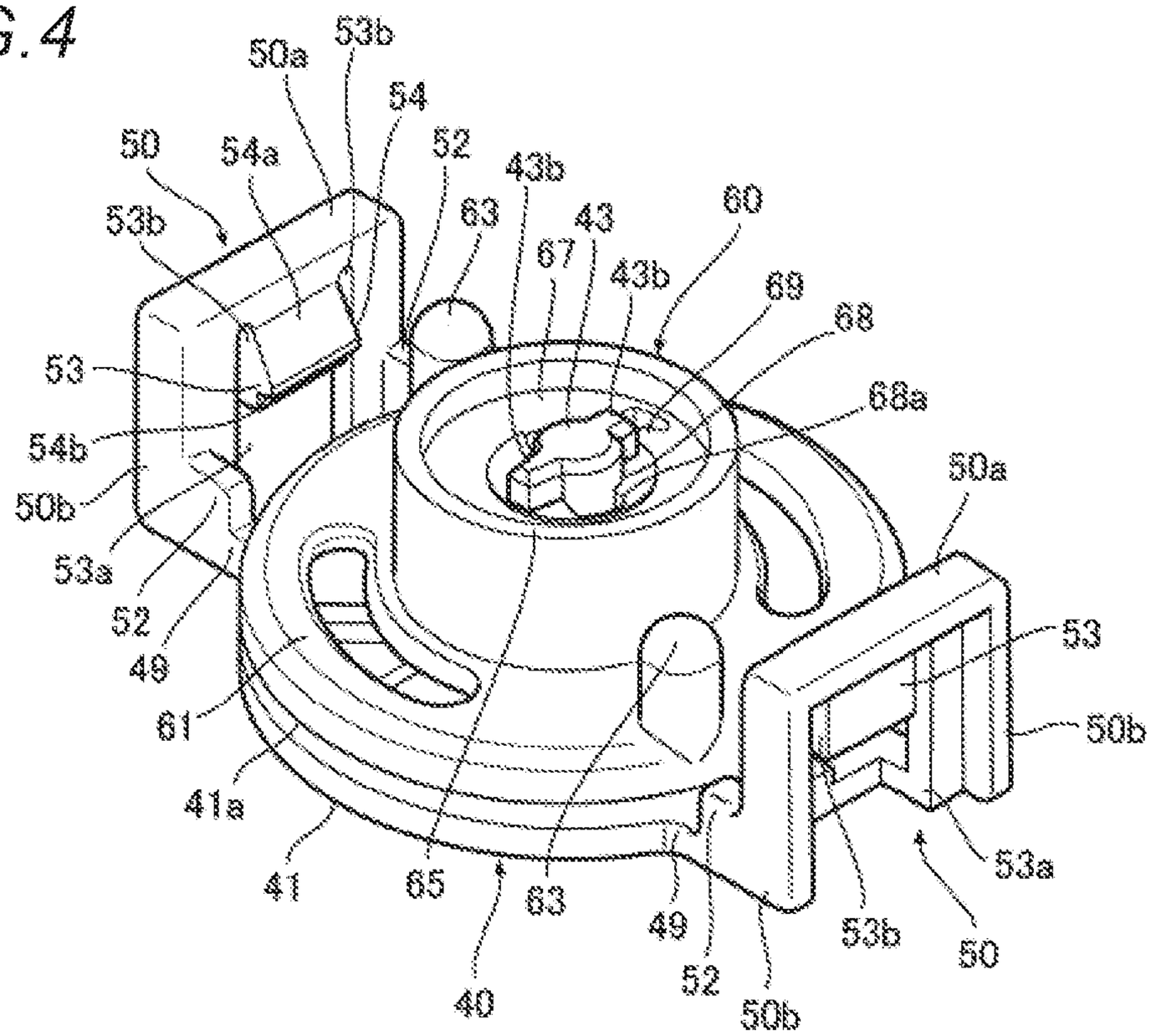

50a
53b
54
50
54a
52
43b
53b
63
43
60
67
43b
69
68
53
68a
54b
50a
50b
53a
52
53
49
61
50b
41a
41
65
63
49
53b
50
53a
40
52
50b

FIG.5

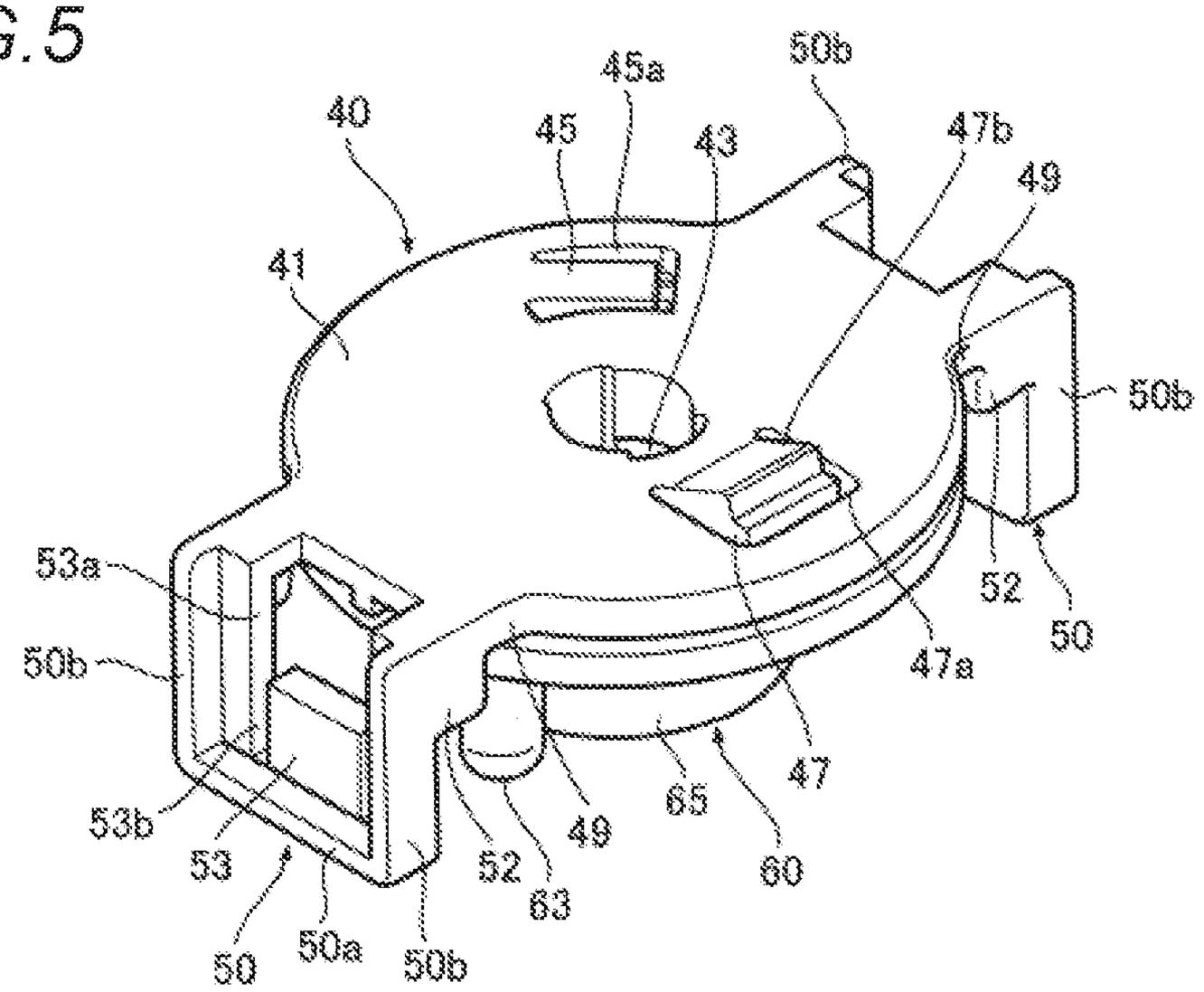
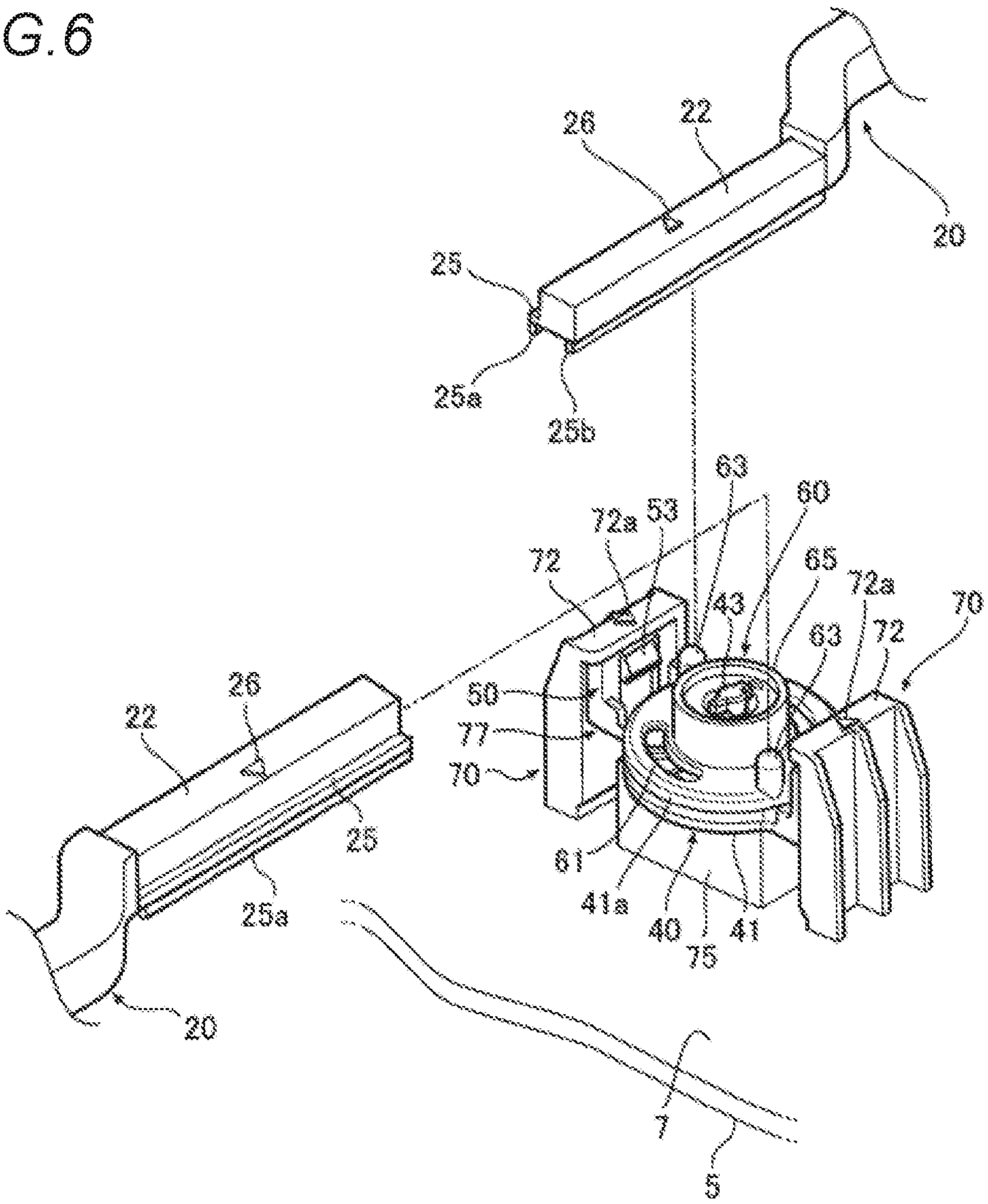

50b
45a
40
45
43
47b
49
41
50b
53a
52
50
50b
47a
53b
53
49
65
47
52
60
63
50
50a
50b

FIG.6



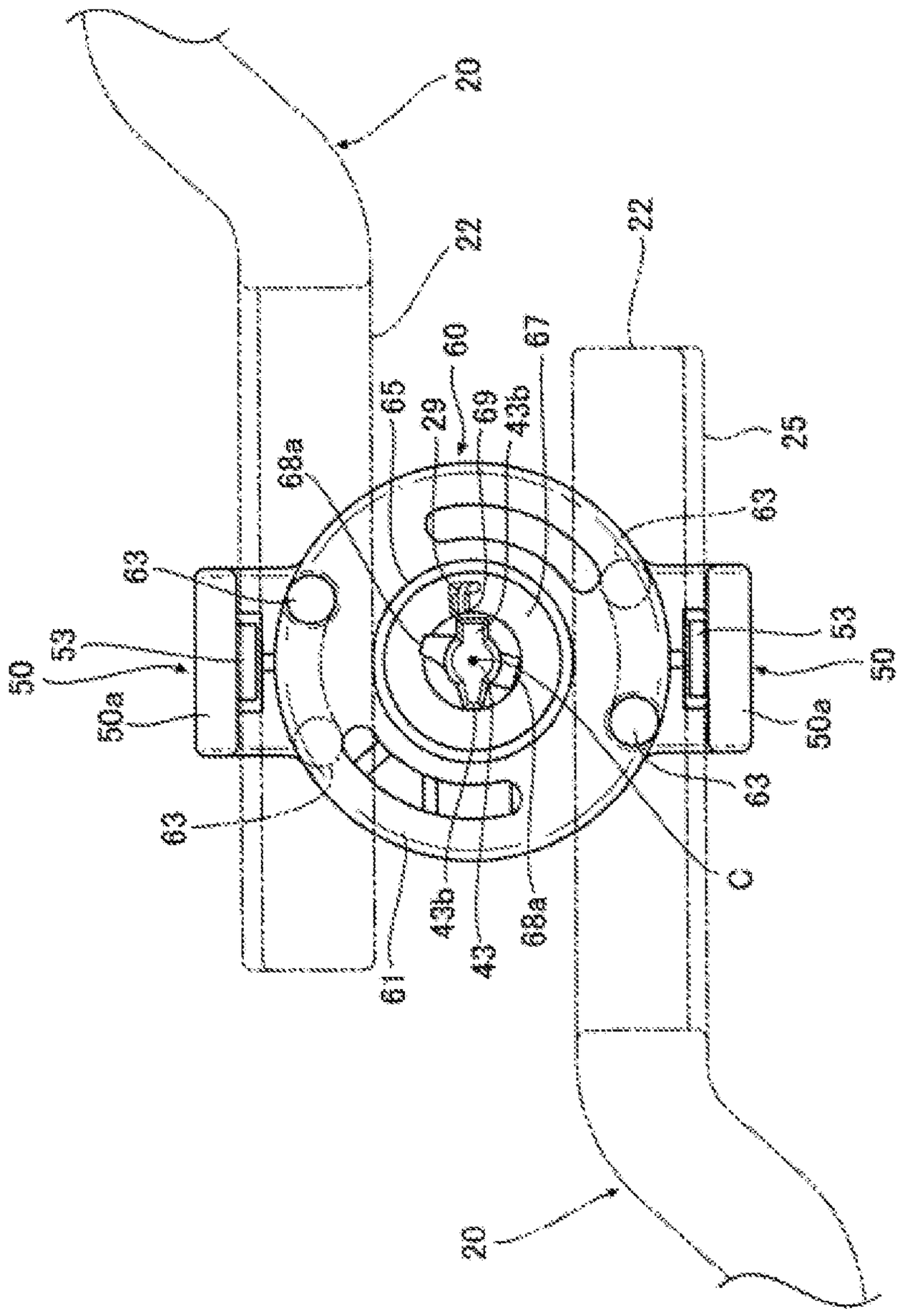

20
22
22
60
67
65
29
69
43b
25
68a
63
63
53
50
50a
53
50
50a
63
63
C
43b
43
68a
61
20

FIG. 7

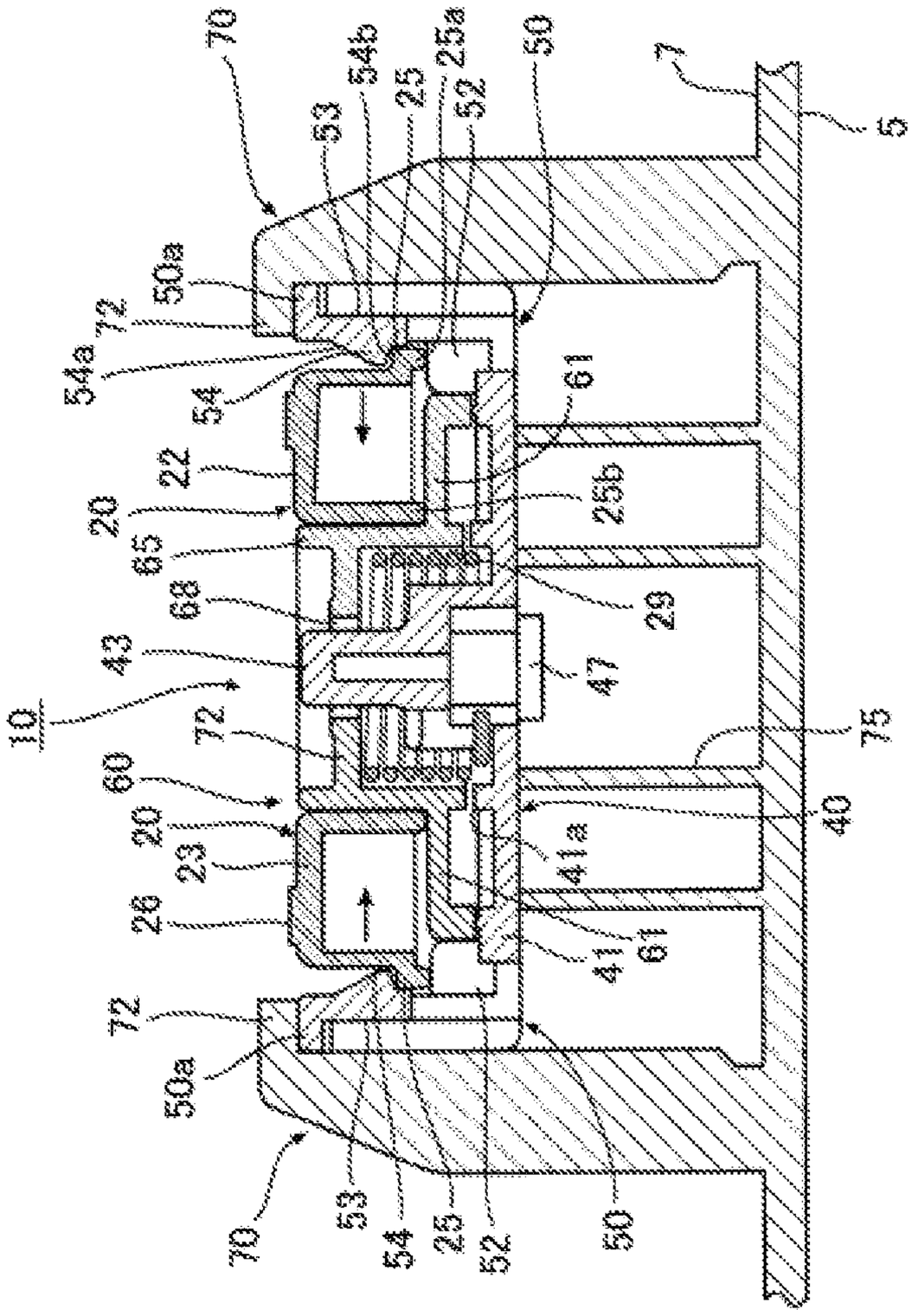

70
53
54b
25
52
25a
50
7
5
50a
72
54a
54
61
22
20
25b
65
68
29
43
47
10
72
75
60
20
40
23
41a
26
61
41
72
50a
70
53
54
25
52
50

FIG. 8

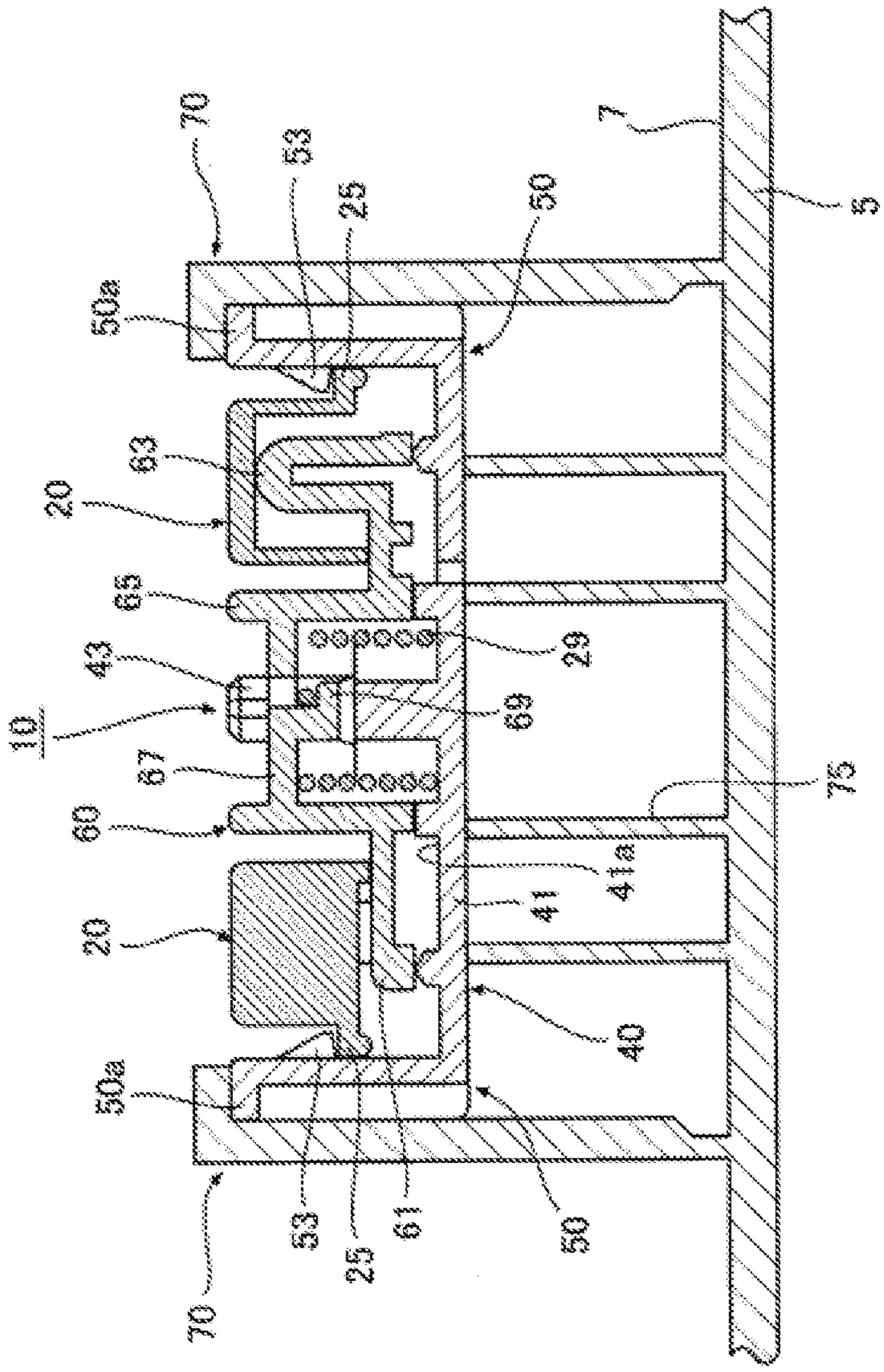
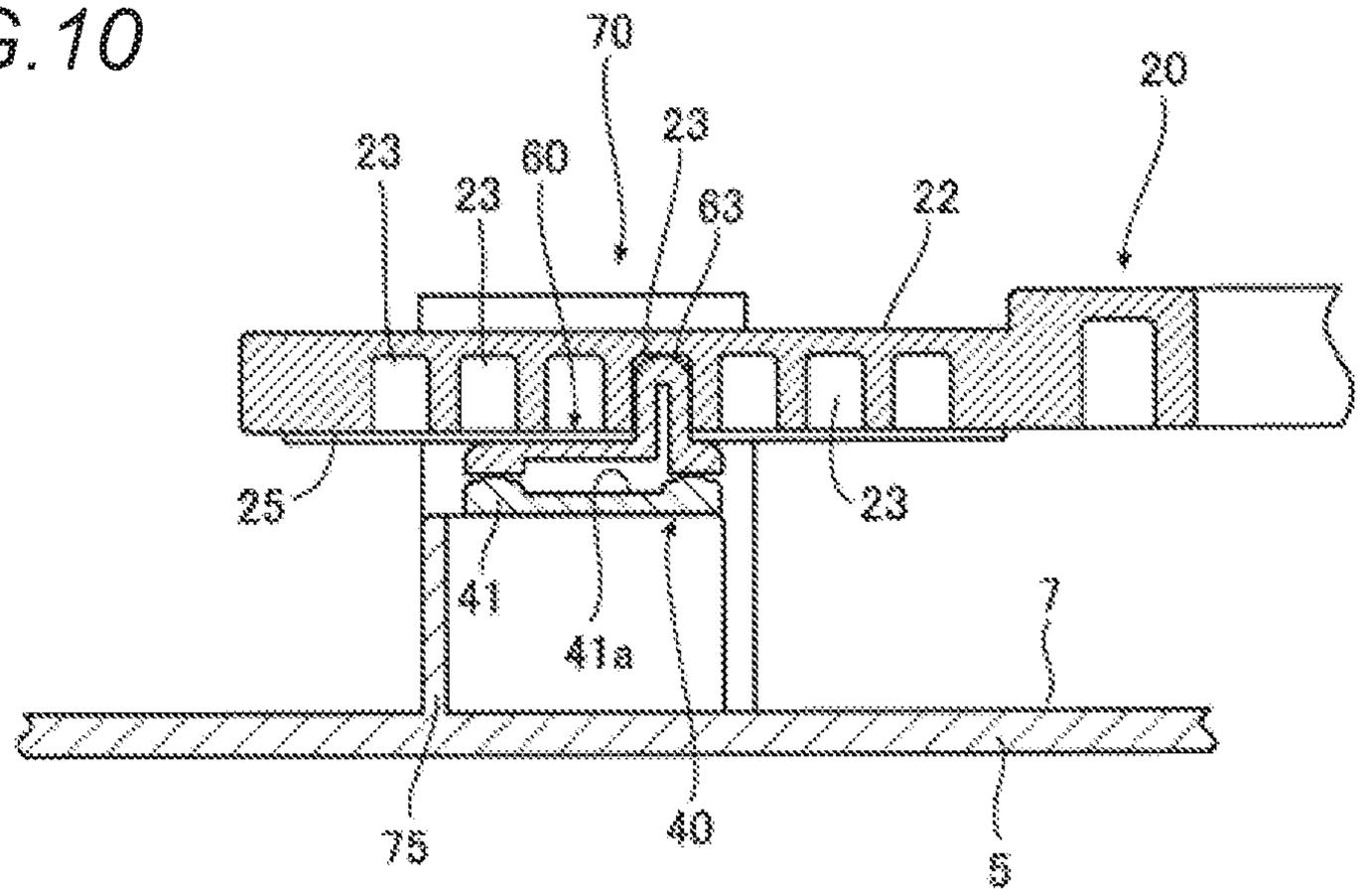

70
53
25
50
7
5
50a
63
20
65
29
43
69
10
67
60
75
41a
41
20
40
50a
0
53
25
61
50
70
7
5

FIG. 9

FIG.10



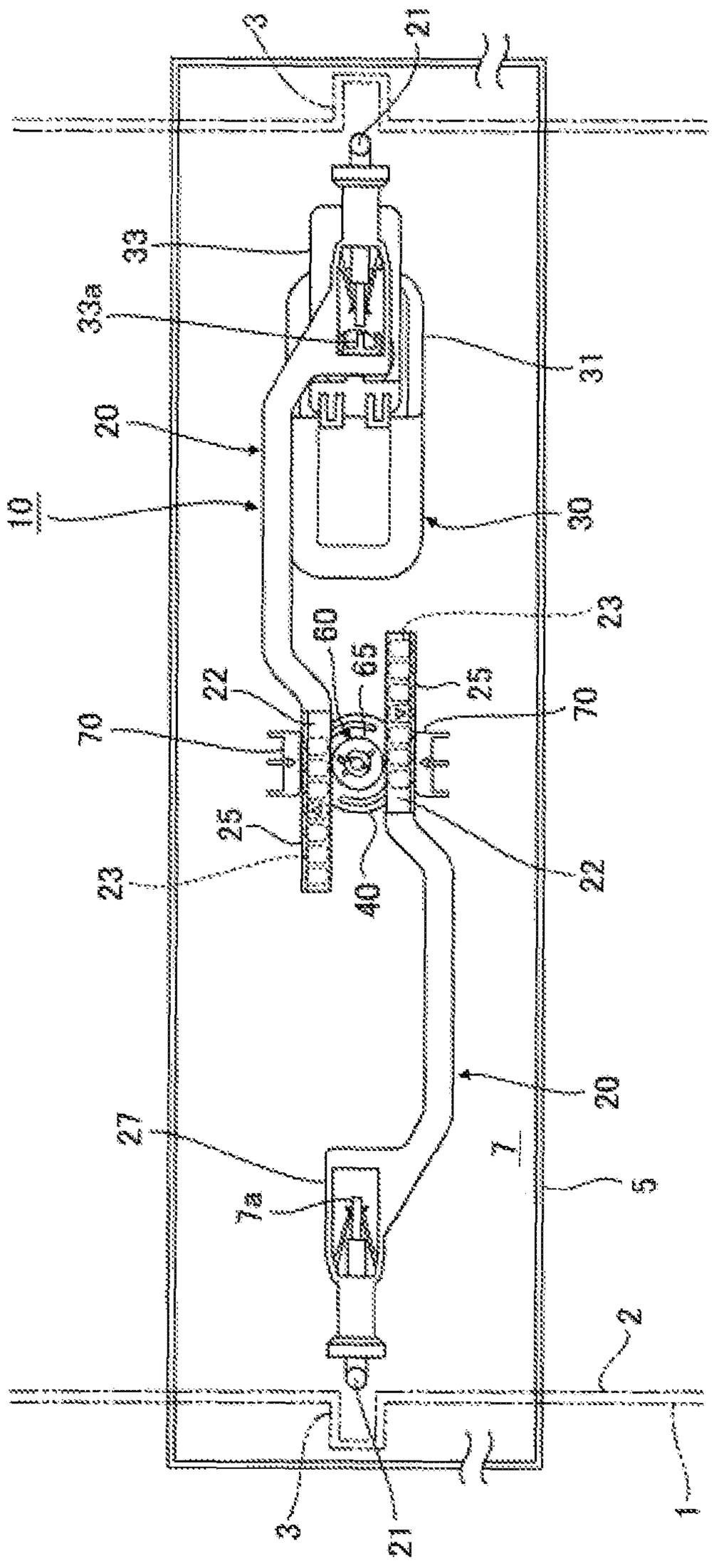
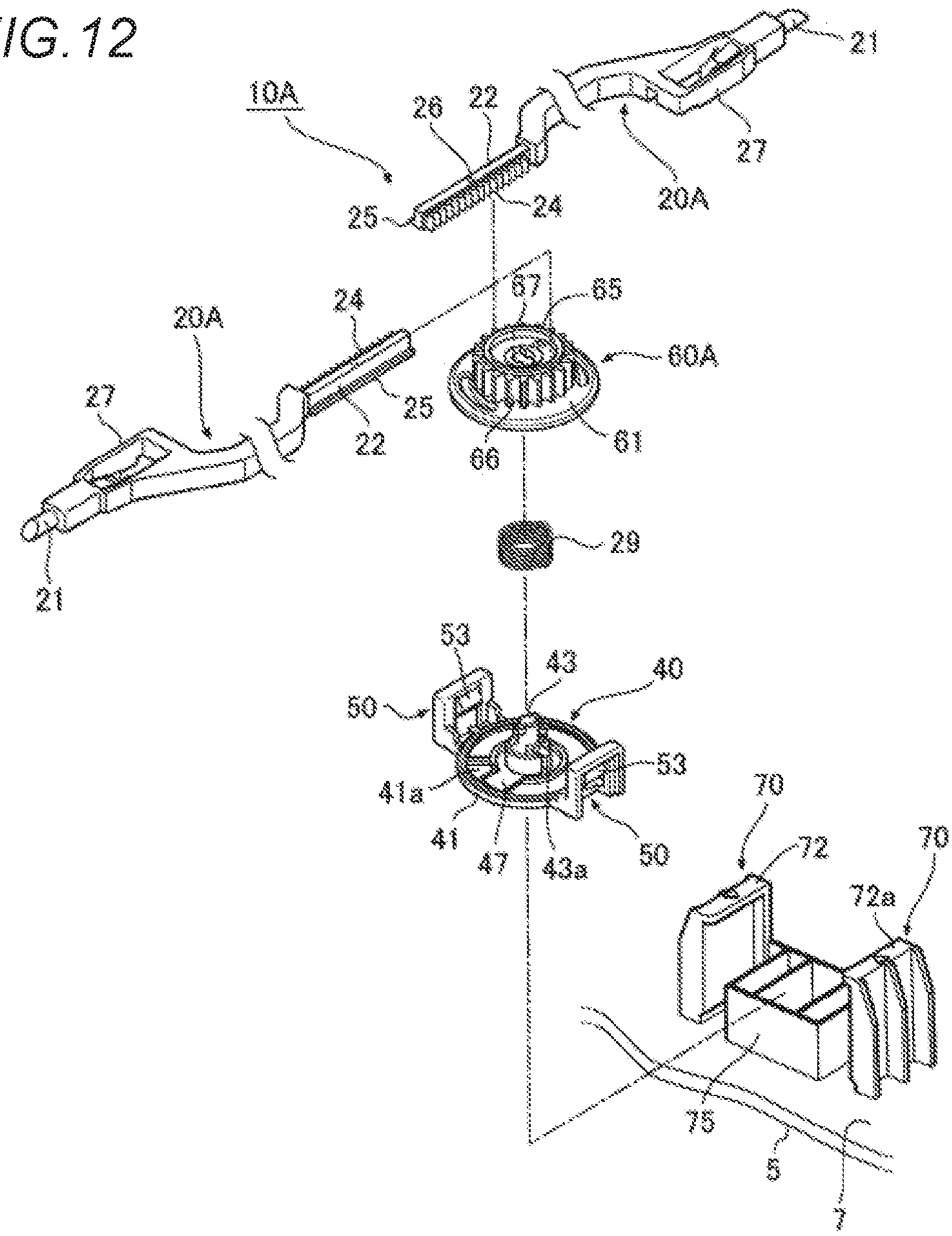

3
21
33
33a
31
20
10
30
23
60
65
22
25
70
70
25
23
40
22
20
27
7a
7
5
2
3
21
1

FIG. 11

FIG. 12


10A
26
22
21
27
25
24
20A
67
65
60A
66
61
29
53
43
40
50
41a
41
47
43a
70
72
72a
75
5
7

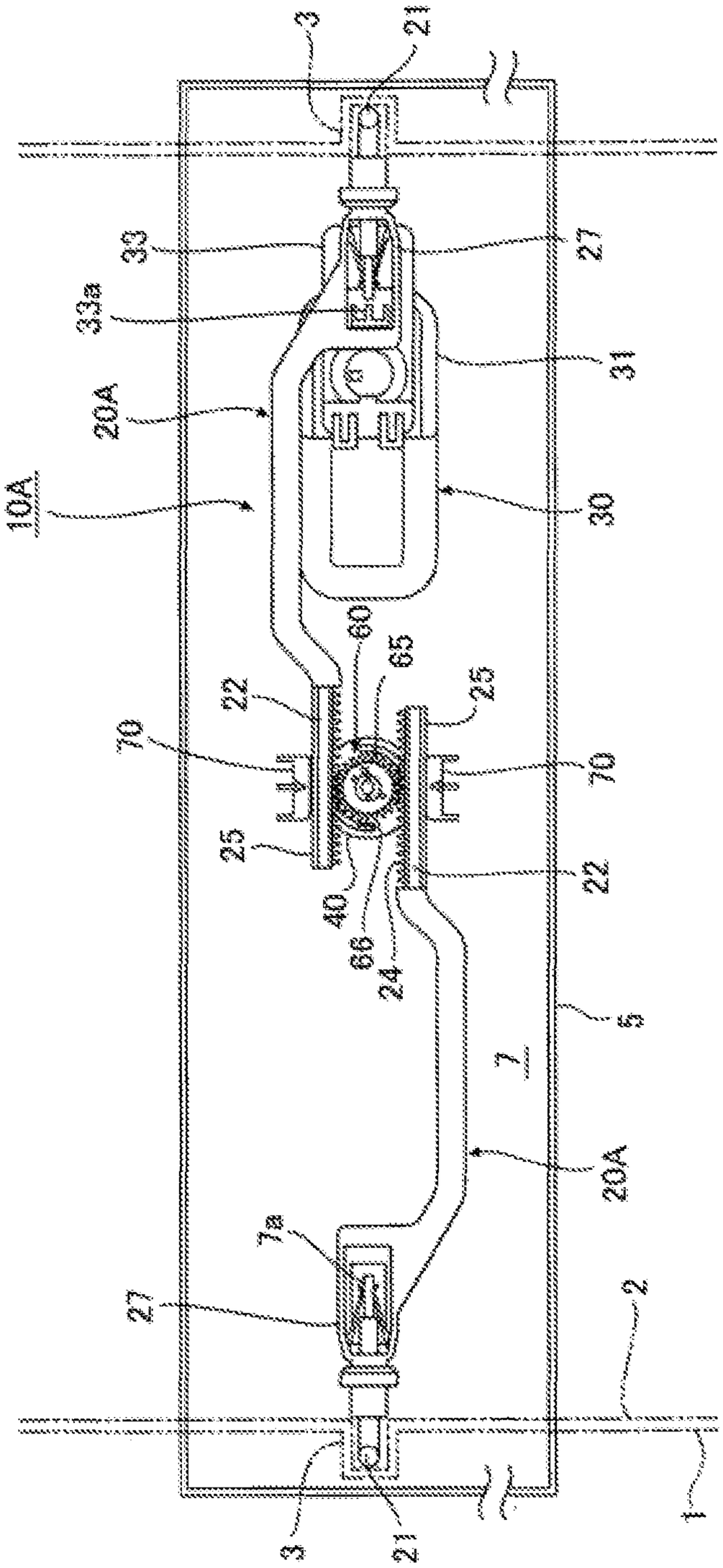

3
21
33
27
33a
31
20A
10A
30
60
65
22
25
70
70
25
22
40
66
24
5
7
20A
7a
27
2
3
21
1

FIG 13

FIG. 14

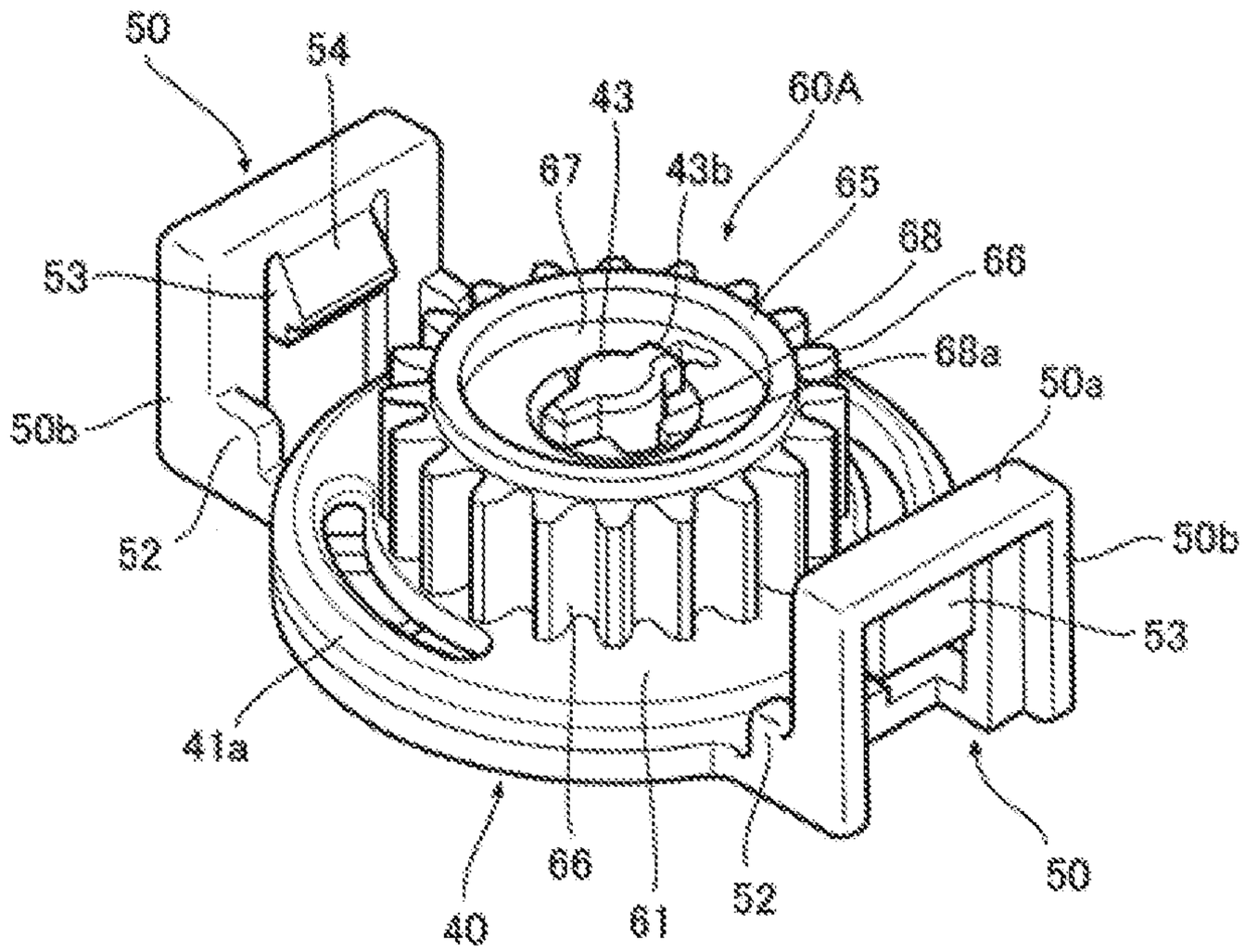
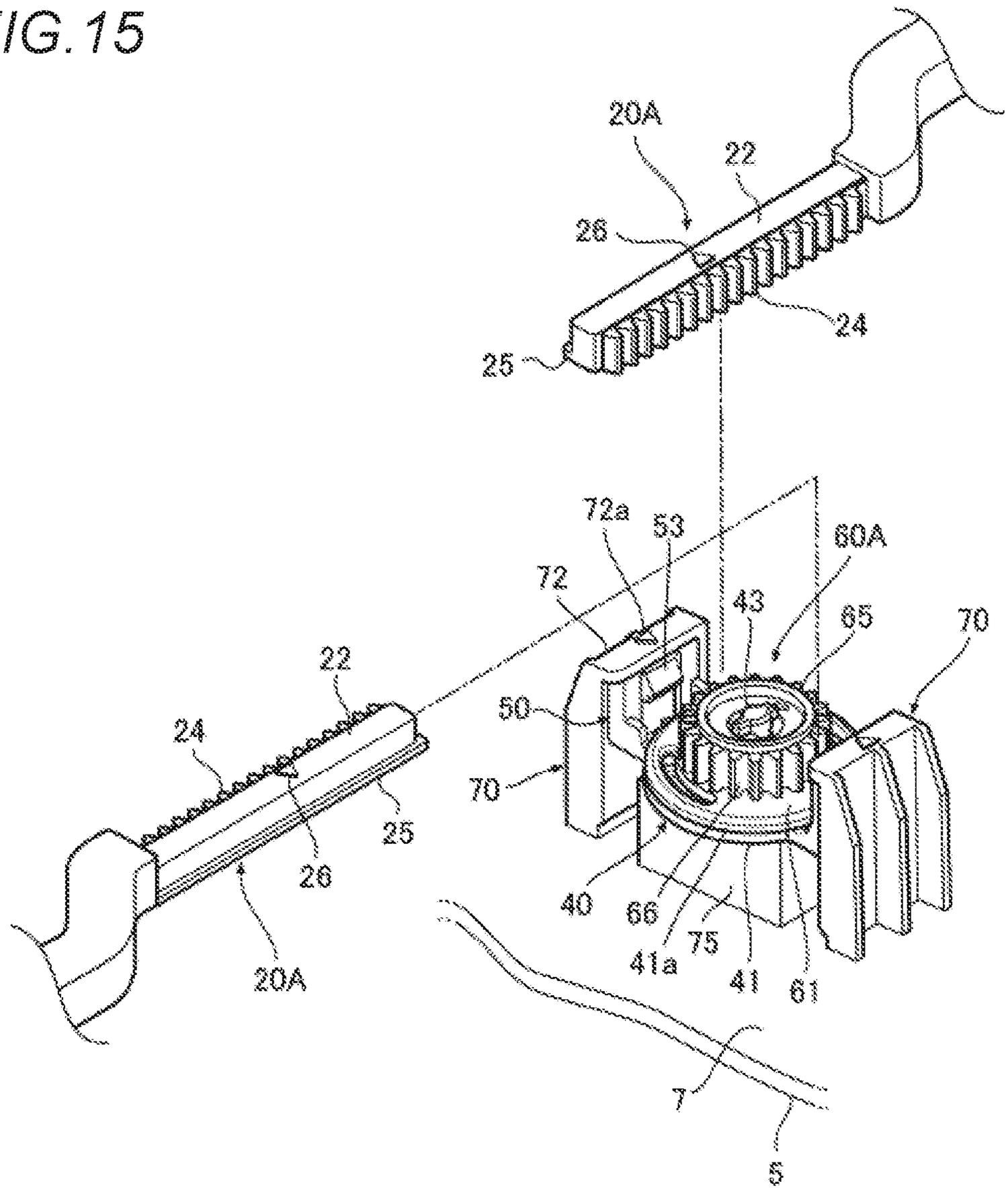

50
54
43
60A
67
43b
65
68
66
53
68a
50a
50b
52
50b
53
41a
66
61
52
40
50

FIG. 15


20A
22
26
24
25
72a
53
60A
72
43
65
70
50
70
40
66
75
41a
41
61
22
24
26
25
20A
A
5

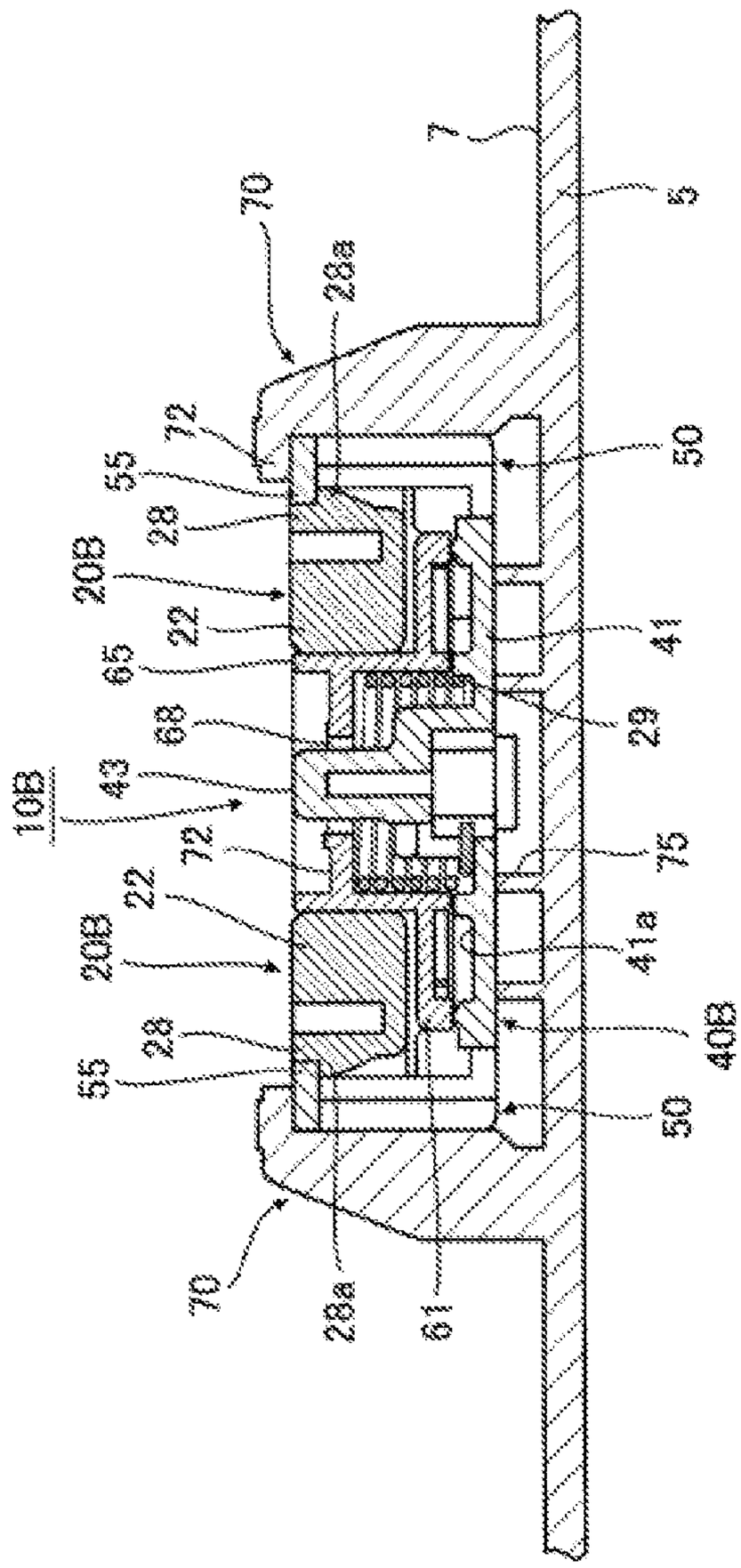

70
28a
7
5
72
55
28
20B
22
65
68
43
10B
72
22
20B
28
55
50
41
29
75
41a
40B
50
70
28a
61

FIG. 16

LOCK DEVICE FOR OPENING AND CLOSING BODY

TECHNICAL FIELD

The present invention relates to an opening and closing body lock device for locking, in a closed state, an opening and closing body that is attached to an opening portion of a fixed body so as to be openable and closable.

BACKGROUND ART

For example, an opening and closing body such as a lid is attached to an opening portion that is formed in a fixed body such as a glove compartment of an automobile, so as to be openable and closable. And a lock device that is locked when the opening and closing body is closed and can be unlocked in opening the opening and closing body is provided between the opening portion and the opening and closing body.

For example, the following Patent document 1 discloses, as an embodiment shown in FIG. **13**, a lock device of the above type which has a base member attached to an opening and closing body, a manipulation member attached to the front side of the base member, a rotor member attached to the back side of the base member, and a lock member which is slid by the rotor member. A cylindrical shaft portion projects from the rotor member at the center and a projection-shaped rotor link portion projects from the outer circumferential surface of the shaft portion. The lock member has a frame-like lock link portion in which the rotor link portion is inserted, a first extension portion which extends from the lock link portion and is to engage with and disengage from an engagement hole, and a second extension portion which extends from the lock link portion to the side opposite to the side to which the first extension portion extends. Furthermore, a pair of elastic-nail-shaped restriction portions are erected on the back side of the base member at positions that are distant from the position of the cylindrical shaft portion of the rotor member by a prescribed distance.

The lock member is pushed into the base member in a state that the lock link portion of the lock member is registered with the rotor link portion of the rotor member and the second extension portion of the lock member is set between the pair of restriction portions. As a result, the pair of restriction portions are opened, the second extension portion of the lock member is inserted between them, and nails formed at the tops of the restriction portions engage with two respective side edges of the lock member, whereby the lock member is prevented from coming off. Furthermore, the rotor link portion is inserted into the lock link portion, whereby the lock member is connected to the rotor member.

PRIOR ART DOCUMENT

Patent Document

Patent Document 1: International Publication WO 2015/125774

SUMMARY OF INVENTION

Problems to be Solved by Invention

In the above lock device, since the rotor link portion of the rotor member and the pair of restriction portions of the base member are located at different positions, when a rod is attached, as mentioned above it is necessary to position the lock link portion and the second extension portion of the lock member with respect to the rotor link portion of the rotor member and the pair of restriction portions, respectively, rendering assembling work cumbersome. Furthermore, since the pair of restriction portions for preventing the lock member from coming off are shaped like elastic nails so as to engage with two respective end portions of the rod member, at the time of assembling it is necessary to push the pair of restriction portions to open them; it is difficult to insert the rod member between the pair of restriction portions.

An object of the invention is therefore to provide an opening and closing body lock device in which rods can be attached to a rotary member easily.

Means for Solving Problems

To attain the above object, the invention provides a lock device for an opening and closing body that is attached to an opening portion of a fixed body so as to be openable and closable, the lock device comprising lock portions provided on one of the opening portion of the fixed body and the opening and closing body; a pair of rods which are provided on the other of the fixed body and the opening and closing body and are to engage with or disengage from the respective lock portions; a base member installed on the fixed body or the opening and closing body; a rotary member which is attached to the base member rotatably; and a manipulation member to manipulate the rods to engage or disengage the rods with or from the respective lock portions, wherein the base member has a bottom portion which faces an installation surface of the fixed body or the opening and closing body and has a bottom surface and a pair of erection walls which are erected from the side of the bottom surface, wherein the rotary member has a rod link portion which is coupled with the rods and transmit rotational power of the rotary member to the rods and a guide wall which is located inside the rod link portion in the rotary member and guides the rods as they slide, and the guide wall is arc walls or a cylindrical wall having arc-shaped surfaces or a circular surface whose axis coincides with the rotation center of the rotary member, wherein when viewed from a direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member are opposed to each other with a gap capable of receiving the associated rod formed in between, and wherein coming-off-preventive structures each of which prevents the associated rod from coming off in the direction perpendicular to the bottom surface of the base member when the rod is inserted in the gap and coupled with the rod link portion is provided between the rod and the associated erection wall of the base member.

In the lock device for the opening and closing body according to the invention, it is preferable that when viewed from the direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member be opposed to each other at least in a range of a rotation locus of the rod link portion.

In the lock device for the opening and closing body according to the invention, it is preferable that each coming-off-preventive structure comprises a bendable, elastic nail which is provided in one of the erection wall and the rod and an engagement target portion which is provided in the other of the erection wall and the rod and engages with the elastic

nail, and the elastic nail engages with the engagement target portion in such a state as to urge the rod to come into contact with the guide wall.

In the lock device for the opening and closing body according to the invention, it is preferable that the erection wall of the base member be formed with the elastic nail and a side surface, opposite to a side surface located on the side of the guide wall of the base member, of the rod be formed with the engagement target portion.

In the lock device for the opening and closing body according to the invention, it is preferable that the engagement target portion be a projection strip which extends in the axial direction of the rod and is formed in the side surface, opposite to the side surface located on the side of the guide wall of the base member, of the rod at a position close to the bottom surface of the base member.

In the lock device for the opening and closing body according to the invention, it is preferable that an outer circumferential surface of the guide wall be formed with a pinion gear which serves as the rod link portion; and that the side surface, located on the side of the guide wall, of the rod be formed with rack grooves which mesh with the pinion gear.

In the lock device for the opening and closing body according to the invention, it is preferable that the rod link portions have a convex shape; and that a portion, located on the side of the bottom surface of the base member, of each rod be formed with plural recesses at prescribed intervals in a sliding direction of the rod in such a manner that the associated rod link portion can be inserted in each recess.

Advantageous Effects of Invention

In the invention, each erection wall of the base member and the guide wall of the rotary member are opposed to each other with the gap capable of receiving the associated rod formed between them. Thus, each erection wall of the base member which is part of the coming-off-preventive structure for the associated rod and the guide wall of the rotary member which guides the rod as it slides can be disposed close to each other. As a result, the rods can be attached to the rotary member easily while being prevented from coming off and guided as they slide by simple work of merely inserting the rods into the gaps between the guide wall and the erection walls and coupling the rods with the rod link portion.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is an exploded perspective view of an opening and closing body lock device according to an embodiment of the present invention.

FIG. **2** is an explanatory diagram of the same lock device.

FIG. **3** is an explanatory diagram of a manipulation member of the same lock device.

FIG. **4** is a perspective view of an assembly of a base member and a rotary member of the same lock device.

FIG. **5** is a perspective view of the assembly of the base member and the rotary member of the same lock device as viewed from a direction that is different than in FIG. **4**.

FIG. **6** is a perspective view showing how rods are attached to the rotary member in the same lock device.

FIG. **7** is an enlarged plan view of an essential part of the same lock device.

FIG. **8** is a sectional view taken along arrowed line A-A in FIG. **2**.

FIG. **9** is a sectional view taken along arrowed line B-B in FIG. **2**.

FIG. **10** is a sectional view taken along arrowed line D-D in FIG. **2**.

FIG. **11** is an explanatory diagram showing a state that an opening and closing body is closed.

FIG. **12** is an enlarged exploded perspective view of an essential part of an opening and closing body lock device according to another embodiment of the invention.

FIG. **13** is an explanatory diagram of the same lock device.

FIG. **14** is a perspective view of an assembly of a base member and a rotary member of the same lock device.

FIG. **15** is a perspective view showing how rods are attached to the rotary member in the same lock device.

FIG. **16** is an enlarged sectional view of an essential part of an opening and closing body lock device according to a further embodiment of the invention.

EMBODIMENTS OF INVENTION

An opening and closing body lock device according to an embodiment of the present invention will be hereinafter described with reference to the drawings.

As shown in FIG. **2**, an opening and closing body lock device **10** (hereinafter referred to as a "lock device **10**") according to the embodiment is used for, for example, open/close-locking an opening and closing body **5** that is attached, so as to be openable and closable, to an opening portion **2** of a fixed body **1**, such as a glove compartment provided in a vehicle instrument panel.

The opening and closing body lock device can be used broadly for various open/close bodies for opening and closing an opening portion of a fixed body. For example, the opening and closing body lock device can be applied to a structure in which a box-shaped glove compartment is attached to an opening portion of an instrument panel in a swingable manner (in this case, the instrument panel is a "fixed body" and the glove compartment is an "opening and closing body") and a structure in which a lid is attached to an opening portion of an instrument panel in an openable and closable manner (in this case, the instrument panel is a "fixed body" and the lid is an "opening and closing body").

As shown in FIG. **2**, in this embodiment, inner surfaces of the opening **2** of the fixed body **1** is provided with two respective recess-shaped lock portions **3**. The shape of each lock portion is not limited to a recess shape and may be any of a hole shape, a projection shape, a frame shape, etc. And the lock portions may be provided for the opening and closing body instead of the fixed body. The lock portions are not restricted these respects.

As shown in FIGS. **1** and **2**, the lock device **10** according to the embodiment is provided for the opening and closing body **5** and has a pair of rods **20** to be engaged with or disengaged from the respective lock portions **3**, a base member **40** which is installed on the opening and closing body **5**, a rotary member **60** which is attached to the base member **40** rotatably, and a manipulation member **30** for manipulating the rods **20** to cause them to be engaged with or disengaged from the respective lock portions **3**. The lock device **10** also has an urging spring **29** which is a torsion spring and serves to urge the rotary member **60** rotationally and thereby urges the rods **20** toward the respective lock portions **3**.

As shown in FIGS. **1** and **2**, the opening and closing body **5** employed in the embodiment is shaped like a plate that is long in the horizontal direction and has an installation

surface **7** on which the base member **40** is installed. The installation surface **7** is provided with a pair of coming-off-preventive walls **70** which hold the base member **40** on the installation surface **7** so that it does not come off the installation surface **7**.

Also referring to FIG. **6**, the pair of coming-off-preventive walls **70** are opposed to each other parallel with each other with a prescribed interval. And a lock box **75** (see FIG. **1**) which has plural circumferential walls and is open at the top and whose internal space is partitioned by plural partition walls is provided between the coming-off-preventive walls **70**. The space that is surrounded by the pair of coming-off-preventive walls **70** and the lock box **75** is a receiving portion **77** which receives the base member **40** coming from a direction that crosses the direction perpendicular to the installation surface **7**.

Each of the pair of coming-off-preventive walls **70** is provided with an insertion restriction portion **71** on the destination side in the base member **40** insertion direction, is formed with a ceiling portion **72** at the top end, and is recessed inside. When the base member **40** is inserted into the receiving portion **77** in the direction that crosses the direction perpendicular to the installation surface **7**, erection walls **50** (described later) of the base member **40** come into contact with the respective insertion restriction portions **71**, whereby the insertion of the base member **40** is restricted. At the same time, the erection walls **50** are locked on the respective ceiling portions **72**, whereby the base member **40** is prevented from coming off the installation surface **7** in the direction perpendicular to it (see FIGS. **6** and **8**). In addition, an elastic lock piece **47** (described later) of the base member **40** is locked on an inside portion of the lock box **75**, whereby the base member **40** is prevented from coming off through the opening of the receiving portion **77**.

Furthermore, an assembling mark **72***a* to serve as a reference mark at the time of attachment of the associated rod **20** is formed on the outer surface of the ceiling portion **72** of each coming-off-preventive wall **70** at a prescribed position (in this example, at the center).

The structure for preventing the base member **40** from coming off the installation surface **7** in the direction perpendicular to it or coming off through the opening of the receiving portion **77** (i.e., in the direction that crosses the direction perpendicular to the installation surface **7**) is not limited to the above structure and may be any of various structures.

As shown in FIGS. **1** and **2**, each of the rods **20** which have the same shape is bent like a crank at a halfway position in its axial direction. And a tip portion **21** of each rod **20** is to be engaged with or disengaged from the associated lock portion **3**. A base portion **22** of each rod **20** extends a prescribed length straightly, and is formed with plural recesses **23** at prescribed intervals in a sliding direction of the rod **20** on the side of a bottom surface **41***a* of the base member **40** (see FIG. **10**). Each recess **23** has an elliptical shape and is formed in such a manner that its shorter axis and longer axis extend in the longitudinal direction of the rod **20** and the direction perpendicular to the longitudinal direction, respectively (see FIG. **2**). Rod link portions **63** (described later) of the rotary member **60** are inserted in and coupled with prescribed recesses **23** of the rods **20**, respectively, whereby the pair of rods **20** are coupled with the rotary member **60**.

Furthermore, as shown in FIGS. **6** and **7**, the side surface, opposite to the side of contact to a guide wall **65** (described later) of the rotary member **60**, of the base portion **22** of each rod **20** is formed with, at a position close to the bottom surface **41***a* of the base member **40**, a projection strip **25** which projects in the axial direction of the rod **20**. An elastic nail **53** (described later) of the base member **40** is engaged with the projection strip **25**, whereby the rod **20** is prevented from coming off in the direction that is perpendicular to the bottom surface **41***a* of the base member **40** (see FIG. **8**). That is, in the embodiment, the projection strip **25** is an "engagement target portion" of a coming-off-preventive structure of the invention.

A contact rib **25***a* projects from the projection strip **25** toward the side of the bottom surface **41***a* of the base member **40**, and a contact rib **25***b* that is shaped like a projection strip projects from the bottom edge of the side surface, on the side of the guide wall **65**, of the base member **40** of the rod **20** (see FIG. **6**). The one contact rib **25***a* comes into contact with a rod receiving portion **52** of the base member **40** and the other contact rib **25***b* comes into contact with a base portion **61** of the rotary member **60**, whereby the area of contact of the rod **20** to the base member **40** and the rotary member **60** is reduced to enhance the slidability of the rod **20** (see FIG. **8**).

Furthermore, the ceiling surface, opposite to the bottom surface, the base portion **22** of each rod **20** is formed with, at a prescribed position, an assembling mark **26** to serve as a reference mark at the time of attachment of the rod **20**.

Each rod **20** is formed with a frame-like portion **27** at a position close to its tip portion **21**. As shown in FIG. **2**, a guide projection **7***a* which projects from the installation surface **7** of the opening and closing body **5** is inserted in the frame-like portion **27** of each rod **20** and thereby guides the rod **20** when it slides. A manipulation piece **33***a* (see FIGS. **2** and **3**) of the manipulation member **30** is inserted in one frame-like portion **27** to slide-manipulate the associated rod **20**.

There are no particular limitations on the shape, structure, etc. of each rod. Although in the embodiment the rods **20** are provided on the opening and closing body side, they may be provided on the fixed body side.

Next, the manipulation member **30** will be described.

As shown in FIGS. **2** and **3**, the manipulation member **30** employed in the embodiment is composed of a fixed body **31** which is fixed to the opening and closing body **5** and a manipulation knob **33** which is attached to the fixed body **31** so as to be able to come closer to and go away from the surface of the opening and closing body **5**. The manipulation knob **33** is provided with the manipulation piece **33***a*, which is inserted in the frame-like portion **27** of the other rod **20** to slide-manipulate the rod **20** (see FIGS. **2** and **3**).

For example, the manipulation member **30** may be a rotary knob or a rotary handle that rotates parallel with the surface of the opening and closing body or the fixed body or a push-type member that is pushed perpendicularly to the surface of the opening and closing body or the fixed body. There are no particular limitations on the structure of the manipulation member **30** as long as it allows the rods **20** to be engaged with and disengaged from the respective lock portions **3**. The manipulation member **30** may be attached to the fixed body side.

Next, the base member **40** will be described.

As shown in FIGS. **4** and **5**, the base member **40** employed in the embodiment has a bottom portion **41** which faces the installation surface **7** of the opening and closing body **5** and has the bottom surface **41***a* and the pair of erection walls **50** which are erected from the bottom surface **41***a* of the bottom portion **41**.

The bottom portion **41** is generally shaped like a circular disc and its one surface is the bottom surface **41***a* on which

the pair of rods **20** are mounted. A shaft portion **43** for supporting the rotary member **60** rotatably projects from the center of the bottom surface **41***a* of the bottom portion **41**. A base portion of the shaft portion **43** is wider than its tip portion, and the outer circumferential surface of its base portion is formed with a spring lock groove **43***a* in which one end of the urging spring **29** is inserted and locked (see FIG. **1**). A pair of projections **43***b* project from the outer circumferential surface of the tip portion of the shaft portion **43** and serve to hold the rotary member **60** so that it does not come off the base member **40**.

As shown in FIG. **5**, the bottom portion **41** is formed with, at a prescribed position outside the shaft portion **43**, a bendable rotation restriction nail **45** (a slit **45***a* is formed around it). The rotation restriction nail **45** is locked on a prescribed portion of the rotary member **60**, whereby rotation of the rotary member **60** is restricted.

As shown in FIG. **5**, the bottom portion **41** is also formed with, outside the shaft portion **43** at a circumferential position that is different than the above-mentioned rotation restriction nail **45**, a bendable elastic lock piece **47** (a slit **47***a* is formed around it) having a lock projection **47***b* on its outer surface. The elastic lock piece **47** is locked on an inside portion of the lock box **75**, whereby the base member **40** is prevented from coming off through the opening of the receiving portion **77**.

A pair of extensions **49** are formed on the outer circumferential surface of the bottom portion **41** at opposite circumferential positions, and the above-mentioned pair of erection walls **50** are erected parallel with each other from the respective extensions **49**. The pair of erection walls **50** are disposed inside the above-mentioned pair of coming-off-preventive walls **70** and outside the guide wall **65** of the rotary member **60** (see FIG. **6**). Furthermore, the pair of erection walls **50** are located outside the pair of rods **20** when the pair of rods **20** are coupled with the rotary member **60** (see FIG. **7**).

As shown in FIG. **4**, two rod receiving portions **52** shaped like rectangular pieces project at corners that are located between each extension **49** and the associated erection wall **50** (on the side of the inner surface of a base portion of the erection wall **50**) and on the two respective sides in the width direction. The rods **20** are supported in such a manner that the above-mentioned contact ribs **25***a* of the rods **20** are in contact with and are supported by the respective rod receiving portions **52** (see FIG. **8**).

Furthermore, the outside of each erection wall **50** is U-shaped by a ceiling portion **50***a* and a pair of side portions **50***b* and is thus open at the bottom (on the side of the bottom surface **41***a*) and the two sides. A bendable, elastic nail **53** is formed inside a frame-like portion of each erection wall **50** (a space **53***a* is formed on the side of the bottom surface **41***a* and a pair of slits **53***b* are formed around the elastic nail **53**). A base portion of the elastic nail **53** is connected to the ceiling portion **50***a* of the erection wall **50** and its free end is directed to the bottom surface **41***a*.

As shown in FIG. **4**, an engagement projection **54** projects as an inside portion of each elastic nail **53**. The engagement projection **54** is formed with, on the side of the ceiling portion **50***a*, a slant surface **54***a* which increases the ease of attachment of the associated rod **20**. The engagement projection **54** is also formed with, at a position close to the tip of the elastic nail **53**, an engagement surface **54***b* to engage with the projection strip **25** of the associated rod **20** (see FIG. **8**).

A coming-off-preventive structure for preventing the associated rod **20** from coming off in the direction perpendicular to the bottom surface **41***a* of the base member **40** is provided between the rod **20** and the associated erection wall **50** of the base member **40**. In the embodiment, as shown in FIG. **8**, the engagement surface **54***b* of the above-mentioned elastic nail **53** is engaged with the projection strip **25** of the associated rod **20** and thereby prevents the rod **20** from coming off; the elastic nail **53** and the projection strip **25** which is an "engagement target portion" constitute the "coming-off-preventive structure" of the invention. The elastic nail **53** is formed so as to engage with the projection strip **25** of the associated rod **20** in a state that the rod **29** is urged so as to come into contact with the guide wall **65** of the rotary member **60** (refer to arrows shown in FIG. **8**).

The "coming-off-preventive structure" is not limited to the structure comprising the above-mentioned elastic nail **53** and projection strip **25**; there are no particular limitations on the "coming-off-preventive structure" as long as it can prevent the associated rod **20** from coming off in the direction perpendicular to the bottom surface of the base member. For example, a structure is possible in which an elastic nail is provided on the rod side and a projection strip or the like is provided on the side of the erection wall of the base member (this structure will be described in an embodiment to be described later).

In the invention, the base member is defined as a member that is installed on the fixed body or the opening and closing body. This includes a case that the base member is installed on the installation surface of the fixed body or the opening and closing body in such a manner as to be in contact with it, the case of the embodiment that the base member **40** is not in contact with the installation surface **7** but is spaced from the installation surface **7** with a prescribed gap (see FIG. **8**), and a case that the base member is installed in such a manner that its bottom surface is located on the side opposite to the installation surface. It is meant that the base member is fixed to the installation surface so as not to be movable relative to it.

Next, the rotary member **60** will be described.

As shown in FIG. **4**, the rotary member **60** employed in the embodiment has a base portion **61** which is generally shaped like a circular disc. Two rod link portions **63** which are coupled with the respective rods **20** and transmit rotational power of the rotary member **60** to the rods **20** project from an outer circumferential portion of the front surface of the base portion **61** at opposite circumferential positions.

In the embodiment, each rod link portion **63** has a convex shape, that is, it is approximately shaped like a cylinder having a round tip portion, can be inserted into and removed from a prescribed recess **23** of the associated rod **20**, and does not have a structure for preventing itself from coming off in the direction perpendicular to the bottom surface **41***a* of the base member **40** (see FIG. **10**). However, there are no particular limitations on the structure of each rod link portion **63**. For example, it is possible that each rod link portion **63** is formed in such a manner that its tip portion is increased in diameter and shaped like a sphere, and that each rod link portion **63** is fitted in a recess **23** of the associated rod **20** so as not to come off it and the associated rod **20** is thus prevented from coming off in the direction perpendicular to the bottom surface **41***a* of the base member **40**. In this case, two coming-off-preventive structures are provided, that is, this structure and the above-mentioned coming-off-preventive structure comprising the engagement surface **54***b* of the elastic nail **53** and the projection strip **25** of the associated rod **20**. This provides an advantage that each rod **20** can be prevented from coming off more reliably.

Each rod link portion **63** is formed so that its outer diameter is suitable for the width of each recess **23** of each rod **20** in the longitudinal direction of the rod **20** (see FIG. **10**), more specifically, so that no play exists in the longitudinal direction of the associated rod **20** and prescribed play exists in the direction perpendicular to the longitudinal direction in a state that each rod link portion **63** is inserted in a recess **23** of the rod **20**.

Furthermore, the rotary member **60** has the guide wall **65** for guiding the pair of rods **20** as they slide inside the pair of rod link portions **63** in the radial direction of the rotary member **60**. As shown in FIGS. **4** and **7**, the guide wall **65** employed in the embodiment projects from the front surface of the base portion **61** at the center and has a cylindrical wall having circular surfaces whose axis coincides with the rotation center C (see FIG. **7**) of the rotary member **60**.

As shown in FIG. **7**, in the lock device **10**, when viewed from the direction perpendicular to the bottom surface **41***a* of the base member **40**, each erection wall **50** of the base member **40** and the guide wall **65** of the rotary member **60** are opposed to each other with a gap capable of receiving the associated rod **20** formed between them. Furthermore, in the embodiment, as shown in FIG. **7**, when viewed from the direction perpendicular to the bottom surface **41***a* of the base member **40**, each erection wall **50** of the base member **40** and the guide wall **65** of the rotary member **60** are opposed to each other at least in a range of a rotation locus (refer to an imaginary line shown in FIG. **7**) of the associated rod link portion **63**.

The guide wall **65** may be a pair of arc-shaped walls that are opposed to each other, plural arc-shaped walls that are arranged in the circumferential direction, or the like; it suffices that the guide wall **65** have a circular surface or arc-shaped surfaces whose axis coincides with the rotation center of the rotary member.

A ceiling plate **67** is formed inside the guide wall **65** at a position close to its top, and an axial hole **68** having two grooves **68***a* are formed through the ceiling plate **67** at the center. The rotary member **60** is supported by the base member **40** rotatably and attached to the base member **40** in such a manner as to be prevented from coming off it by inserting the shaft portion **43** into the axial hole **68** with two projections **43***b* of the shaft portion **43** of the base member **40** registered with the two respective grooves **68***a* and then rotating the rotary member **60**. There are no particular limitations on the structure for supporting the rotary member **60** rotatably; for example, the rotary member and the base member may be formed with a shaft portion and an axial hole, respectively. Furthermore, the ceiling plate **67** is formed with, adjacent to the outer circumference of the axial hole **68**, a spring lock piece **69** on which the other end of the urging spring **29** is locked.

The rotary member **60** is urged by the urging spring **29** so as to rotate in the direction indicated by arrows F in FIG. **2**, whereby the pair of rods **20** which are coupled with the rotary member **60** are urged in such directions as to engage with the pair of lock portions **3**, respectively. The pair of rods **20** which are coupled with the rotary member **60** can slide in synchronism with each other; when one rod **20** slides, the other rod **20** also slides in linkage with the former action.

There are no particular limitations on the rotary member that allows the pair of rods to slide. An example other than the rotary member **60** employed in the embodiment is a structure in which a pinion gear is employed and each of the pair of rods is formed with rack grooves. The pinion gear is meshed with the rack grooves, whereby when one rod slides, the other rod is slid via the pinion gear. Lock devices having the rack-pinion structure will be described later in other embodiments to be described later.

Next, workings and advantages of the lock device **10** having the above configuration will be described.

First, a procedure for attaching the rotary member **60** to the base member **40** will be described. After the one end of the urging spring **29** is locked on the spring lock groove **43***a* of the base member **40** and the other end of the urging spring **29** is locked on the spring lock piece **69** of the rotary member **60**, the shaft portion **43** is inserted into the axial hole **68** with the two projections **43***b* of the shaft portion **43** of the base member **40** registered with the two grooves **68***a* of the rotary member **60** against rotational urging force of the urging spring **29**. As a result, the rotary member **60** is urged rotationally by the urging spring **29** and the projections **43***b* of the shaft portion **43** are located outside the axial hole **68** on its front side, whereby the rotary member **60** is attached to the base member **40** rotatably in such a manner as to be prevented from coming off it (see FIG. **4**).

Subsequently, the base member **40** is inserted into the receiving portion **77** from a direction that crosses the direction perpendicular to the installation surface **7**. As a result, the pair of erection walls **50** of the base member **40** are placed inside the pair of coming-off-preventive walls **70** and the ceiling portions **50***a* of the erection walls **50** are locked on the ceiling portions **72** of the coming-off-preventive walls **70**, respectively, whereby the base member **40** is prevented from coming off the installation surface **7** in the direction perpendicular to it (see FIG. **8**). Furthermore, the erection walls **50** of the base member **40** come into contact with the insertion restriction portions **71** of the coming-off-preventive walls **70**, respectively, whereby the insertion of the base member **40** is restricted. And the lock projection **47***b* of the elastic lock piece **47** of the base member **40** is engaged with the inside of an edge of the lock box **75**, whereby the base member **40** is prevented from coming off through the opening of the receiving portion **77**. In this manner, the base member **40** on which the rotary member **60** is mounted is installed on the installation surface **7** of the opening and closing body **5**. In this state, each erection wall **50** of the base member **40** and the guide wall **65** of the rotary member **60** are opposed to each other with the gap capable of receiving the associated rod **20** formed between them (see FIG. **7**).

Then, as shown in FIG. **6**, the base portions **22** of the pair of rods **20** are pushed into the gaps between the guide wall **65** of the rotary member **60** and the erection walls **50** of the base member **40** toward the bottom surface **41***a* of the base member **40** in the direction perpendicular to the bottom surface **41***a*. The rods **20** are pushed in a state that the assembling marks **26** of the rods **20** are positioned with respect to the assembling marks **72***a* of the coming-off-preventive walls **70**, respectively.

As a result, while the rod link portions **63** are inserted into the prescribed recesses **23** of the rods **20**, respectively, the slant surfaces **54***a* of the elastic nails **53** are pressed against the contact ribs **25***a* of the projection strips **25** of the rods **20**, respectively, and the elastic nails **53** are bent. When the projection strips **25** thereafter go over the tops of the engagement projections **54** of the elastic nails **53** and reach the engagement surfaces **54***b*, respectively, the elastic nails **53** undergo elastic recovery, their engagement surfaces **54***b* engage with the respective projection strips **25**, and urge the respective rods **20** so that they come into contact with the guide wall **65** (refer to the arrows shown in FIG. **8**). Furthermore, the rod link portions **63** are inserted into the recesses **23** of the rods **20**, respectively, and the tip portions of the former come into contact with the inner surfaces of the

latter (see FIG. **9**). In this manner, the rods **20** can be attached to the rotary member **60** in a state that the rods **20** are prevented from coming off the bottom surface **41***a* of the base member **40**.

In this state, in the lock device **10**, as shown in FIG. **7**, each erection wall **50** of the base member **40** and the guide wall **65** of the rotary member **60** are opposed to each other with the gap capable of receiving the associated rod **20** formed between them. Thus, each erection wall **50** of the base member **40** which is part of the coming-off-preventive structure for the associated rod **20** and the guide wall **65** of the rotary member **60** which guides the rod **20** as it slides can be disposed close to each other. As a result, as described above, the rods **20** can be attached to the rotary member **60** easily while being prevented from coming off and guided as they slide by simple work of merely inserting the rods **20** into the gaps between the guide wall **65** and the erection walls **50** and coupling the rods **20** with the respective rod link portions **63**.

In the embodiment, as shown in FIG. **7**, when viewed from the direction perpendicular to the bottom surface **41***a* of the base member **40**, each erection wall **50** of the base member **40** and the guide wall **65** of the rotary member **60** are opposed to each other at least in the range of a rotation locus (refer to the imaginary line shown in FIG. **7**) of the associated rod link portion **63**. Thus, each erection wall **50** and the guide wall **65** can be disposed closer to each other and work of attaching the rods **20** to the rotary member **60** can be carried out more easily.

Furthermore, in the embodiment, as shown in FIG. **8**, the elastic nails **53** which are provided in the base member **40** are formed so as to engage with the respective rods **20** while urging the rods **20** so that they come into contact with the guide wall **65** of the rotary member **60**. Thus, play of the rods **20** with respect to the rotary member **60** can be suppressed and abnormal sound generated by play can be reduced. In addition, the performance of guidance of the rods **20** by the guide wall **65** can be increased.

In the embodiment, the above-described elastic nails **53** are formed in the respective erection walls **50** of the base member **40** and the side surface, opposite to the side surface located on the side of the guide wall **65** of the base member **40**, of each rod **20** is formed with the engagement target portion (in the embodiment, projection strip **25**). Thus, the elastic nail **53** and the engagement target portion that constitute each coming-off-preventive structure can be formed within the range of the thickness of the associated rod **20** (i.e., the height of the rod **20** from its end on the side of the bottom surface **41***a* of the base member **40**), whereby the lock device **10** can be made thin and hence compact.

Still further, in the embodiment, the above-described engagement target portion which is part of the coming-off-preventive structure is the projection strip **25** which is formed so as to extend in the axial direction of the associated rod **20** in the side surface, opposite to the side surface located on the side of the guide wall **65** of the base member **40**, of the rod **20** at the position close to the bottom surface **41***a* of the base member **40**. Thus, the bending portion of the elastic nail **53** to engage with the engagement target portion can be made long (see FIG. **8**). As a result, while the lock device **10** is made thinner, the elastic nail **53** is made easier to bend to increase the ease of insertion of the associated rod **20** into the gap between the erection wall **50** and the guide wall **65**.

In the embodiment, each rod **20** is formed with, on the side of the bottom surface of the base member **40**, the plural recesses **23** into which the convex rod link portion **63** is to be inserted (see FIG. **10**). Thus, the projection length of the tip portion **21** of each rod **20** can be changed by changing, as appropriate, the recess **23** to which the associated rod link portion **63** is inserted (i.e., the insertion position of the associated rod link portion **63**; see FIG. **2**). This makes it easier to use the rods **20** for plural vehicle types and hence can increase the versatility of the rods **20**.

In the lock device **10**, the opening and closing body **5** is locked in a closed state when and the opening portion **2** of the fixed body **1** is closed by the opening and closing body **5** and the tip portions **21** of the pair of rods **20** are engaged with the pair of lock portions **3** of the fixed body **1**, respectively (see FIG. **2**). When in this state one rod **20** is pulled inward in the opening and closing body **5** via the manipulation piece **33***a* by manipulating the manipulation knob **33** of the manipulation member **30**, the other rod **20** is also pulled inward in the opening and closing body **5** via the rotary member **60**. As a result, the engagement between the tip portions **21** of the pair of rods **20** and the pair of lock portions **3** is canceled to make it possible to open the opening and closing body **5** from the opening portion **2** of the fixed body **1** (see FIG. **11**).

FIGS. **12-15** show an opening and closing body lock device according to another embodiment of the invention. Portions, members, etc. having substantially the same ones in the above embodiment will be given the same symbols as the latter and descriptions therefor will be omitted.

As shown in FIG. **12**, the opening and closing body lock device **10**A (hereinafter referred to as a "lock device **10**A") according to this embodiment is different from the opening and closing body lock device according to the above embodiment in the structure for coupling a rotary member **60**A with a pair of rods **20**A.

As shown in FIG. **14**, the outer circumferential surface of a guide wall **65** of the rotary member **60**A employed in this embodiment is formed with a pinion gear **66** which is a "rod link portion" of the invention. That is, in the rotary member **60**A, the cylindrical guide wall **65** is provided inside the pinion gear **66** which is the "rod link portion." On the other hand, the surface, on the side of the guide wall **65**, of a base portion **22** of each rod **20**A is formed with rack grooves **24** to mesh with the above-mentioned pinion gear **66**.

In this embodiment, since the outer circumferential surface of the guide wall **65** is formed with the pinion gear **66** which is the rod link portion and the side surface, on the side of the guide wall **65**, of each rod **20**A is formed with the rack grooves **24**, as shown in FIG. **15** the rods **20** can be inserted into the gaps between the guide wall **65** and the erection walls **50** from the direction perpendicular to the bottom surface **41***a* of the base member **40**. Thus, the two sets of rack groves **24** can be meshed with the pinion gear **6** easily, the pair of rods **20** can be attached easily in synchronism with each other, and the projection lengths (projection margins), on the side of the tip portions **21**, of the respective rods **20** can be adjusted easily.

In the assembled state, the rods **20**A are prevented from coming off in such a manner that the elastic nails **53** of the base member **40** are engaged with the projection strips **25** of the rods **20**A, respectively. Since as in the above embodiment the elastic nails **53** are engaged with the projection strips **25** in such a state as to urge the rods **20**A to come into contact with the guide wall **65** of the rotary member **60**A, they can absorb backlash between the pinion gear **66** and the two sets of rack grooves **24**.

FIG. **16** shows an opening and closing body lock device according to a further embodiment of the invention. Portions, members, etc. having substantially the same ones in

the above embodiment will be given the same symbols as the latter and descriptions therefor will be omitted.

As shown in FIG. **16**, the opening and closing body lock device (hereinafter referred to as a "lock device **10**B") according to this embodiment is different than that according to the above embodiment in the structure for preventing rods **20**B from coming off in the direction perpendicular to a bottom surface **41***a* of a base member **40**B.

More specifically, as shown in FIG. **16**, the side surface, opposite to the side surface on the side of the guide wall **65**, of each rod **20**B is formed with a bendable, elastic nail **28**. The elastic nail **28** is formed in such a manner that its base portion is located on the side of the bottom surface of the rod **20**B, its free end is located on the side of the ceiling surface of the rod **20**B and an engagement projection **28***a* is located on the outer surface of the elastic mail. On the other hand, a lock wall **55** projects inward from a top end portion (i.e., an end portion opposite to the bottom surface **41***a*) of the associated erection wall **50** of the base member **40**B.

The engagement projection **28***a* of the elastic nail **28** of each rod **20**B engages with the associated lock wall **55** of the base member **40**B, whereby the rod **20**B is attached in such a state as to be prevented from coming off from the side of the bottom surface **41***a* of the base member **40**B.

The invention is not limited to the above embodiments. Various modifications are possible without departing from the spirit and scope of the invention, and such modifications are also included in the scope of the invention.

BRIEF DESCRIPTION OF REFERENCE NUMERALS

1: Fixed Body
2: Opening Portion
3: Lock Portion
5: Opening and Closing Body
7: Installation Surface
10, **10**A, **10**B: Lock Device
20, **20**A, **20**B: Rod
24: Rack Grooves
25: Projection Strip
28: Elastic Nail
29: Urging Spring
30: Manipulation Member
40, **40**A, **40**B: Base Member
41: Bottom Portion
41*a*: Bottom Surface
43: Shaft Portion
47: Elastic Lock Piece
50: Erection Wall
53: Elastic Nail
60, **60**A: Rotary Member
63: Rod Link Portion
65: Guide Wall
66: Pinion Gear
70: Coming-Off-Preventive Wall

The invention claimed is:

1. A lock device for an opening and closing body that is attached to an opening portion of a fixed body so as to be operable and closable, the lock device comprising:

lock portions provided on one of the opening portion of the fixed body and the opening and closing body;

a pair of rods which are provided on the other of the fixed body and the opening and closing body and are to engage with or disengage from the respective lock portions;

a base member installed on the fixed body or the opening and closing body;

a rotary member which is attached to the base member rotatably; and

a manipulation member to manipulate the rods to engage or disengage the rods with or from the respective lock portions,

wherein the base member has a bottom portion which faces an installation surface of the fixed body or the opening and closing body and has a bottom surface and a pair of erection walls which are erected from the side of the bottom surface,

wherein the rotary member has a rod link portion which is coupled with the rods and transmit rotational power of the rotary member to the rods and a guide wall which is located inside the rod link portion in the rotary member and guides the rods as they slide, and the guide wall comprises arc walls or a cylindrical wall having arc-shaped surfaces or a circular surface whose axis coincides with the rotation center of the rotary member,

wherein when viewed from a direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member are opposed to each other with a gap capable of receiving the associated rod formed in between,

wherein coming-off-preventive structures each of which prevents the associated rod from coming off in the direction perpendicular to the bottom surface of the base member when the rod is inserted in the gap and coupled with the rod link portion is provided between the rod and the associated erection wall of the base member,

wherein each coming-off-preventive structure comprises a bendable, elastic nail which is provided in the erection wall and an engagement target portion which is provided in the rod and engages with the elastic nail,

wherein each of the pair of erection walls is formed with a space which penetrates therethrough in a direction in which the pair of erection walls face each other, and

wherein each of the pair of erection walls is formed into a frame-like shape surrounding the space, and the elastic nail is formed into a shape extending from the erection wall toward the space.

2. The lock device for the opening and closing body according to claim **1**, wherein when viewed from the direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member are opposed to each other at least in a range of a rotation locus of the rod link portion.

3. The lock device for the opening and closing body according to claim **1**, wherein a side surface, opposite to a side surface located on the side of the guide wall of the base member, of the rod is formed with the engagement target portion.

4. The lock device for the opening and closing body according to claim **3**, wherein the engagement target portion is a projection strip which extends in the axial direction of the rod and is formed in the side surface, opposite to the side surface located on the side of the guide wall of the base member, of the rod at a position close to the bottom surface of the base member.

5. The lock device for the opening and closing body according to claim **1**,

wherein an outer circumferential surface of the guide wall is formed with a pinion gear which serves as the rod link portion, and

wherein the side surface, located on the side of the guide wall, of the rod is formed with rack grooves which mesh with the pinion gear.

6. The lock device for the opening and closing body according to claim **1**,

wherein the rod link portions have a convex shape, and

wherein a portion, located on the side of the bottom surface of the base member, of each rod is formed with plural recesses at prescribed intervals in a sliding direction of the rod in such a manner that the associated rod link portion can be inserted in each recess.

7. The lock device for the opening and closing body according to claim **1**, wherein when viewed from the direction perpendicular to the bottom surface of the base member, the elastic nail of the base member and the guide wall of the rotary member are disposed so as to be opposed to each other.

8. The lock device for the opening and closing body according to claim **1**, wherein the elastic nail is formed into the shape that has a base portion disposed at a side of a tip portion of the erection wall in an erection direction thereof and a free end extending in the space from the base portion toward the bottom surface of the base member.

9. The lock device for the opening and closing body according to claim **8**, wherein the elastic nail engages with the engagement target portion in such a state as to urge the rod to come into contact with the guide wall at a side of the free end thereof.

10. The lock device for the opening and closing body according to claim **1**, wherein the opening and closing body includes an installation surface that is provided with the coming-off-preventive structures.

11. The lock device for the opening and closing body according to claim **10**, wherein a space that is surrounded by the corning-off-preventive structures comprises a receiving portion which receives the base member coming from a direction that crosses a direction perpendicular to the installation surface.

12. The lock device for the opening and closing body according to claim **11**, wherein each coming-off-preventive structure comprises an insertion restriction portion on a destination side in a base member insertion direction and is formed with a ceiling portion at a top end, and is recessed inside.

13. The lock device for the opening and closing body according to claim **12**, wherein, when the base member is inserted into the receiving portion in the direction that crosses the direction perpendicular to the installation surface, the erection walls of the base member come into contact with the respective insertion restriction portions, thereby the insertion of the base member is restricted.

14. The lock device for the opening and closing body according to claim **12**, wherein the erection walls are locked on the ceiling portion, thereby the base member is prevented from coming off the installation surface in the direction perpendicular to the base member.

15. The lock device for the opening and closing body according to claim **1**, wherein a shaft portion for supporting the rotary member rotatably projects from the bottom portion.

16. The lock device for the opening and closing body according to claim **15**, wherein a base portion of the shaft portion is wider than a tip portion, and an outer circumferential surface of the base portion is formed with a spring lock groove in which one end of an urging spring is inserted and locked.

17. A lock device for an opening and closing body that is attached to an opening portion of a fixed body so as to be operable and closable, the lock device comprising:

lock portions provided on one of the opening portion of the fixed body and the opening and closing body;

a pair of rods which are provided on the other of the fixed body and the opening and closing body and are to engage with or disengage from the respective lock portions;

a base member installed on the fixed body or the opening and closing body;

a rotary member which is attached to the base member rotatably; and

a manipulation member to manipulate the rods to engage or disengage the rods with or from the respective lock portions,

wherein the base member has a bottom portion which faces an installation surface of the fixed body or the opening and closing body and has a bottom surface and a pair of erection walls which are erected from the side of the bottom surface,

wherein the rotary member has a rod link portion which is coupled with the rods and transmit rotational power of the rotary member to the rods and a guide wall which is located inside the rod link portion in the rotary member and guides the rods as they slide, and the guide wall comprises arc walls or a cylindrical wall having arc-shaped surfaces or a circular surface whose axis coincides with the rotation center of the rotary member,

wherein when viewed from a direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member are opposed to each other with a gap capable of receiving the associated rod formed in between,

wherein coming-off-preventive structures each of which prevents the associated rod from coming off in the direction perpendicular to the bottom surface of the base member when the rod is inserted in the gap and coupled with the rod link portion is provided between the rod and the associated erection wall of the base member,

wherein each coming-off-preventive structure comprises a bendable, elastic nail which is provided in the erection wall and an engagement target portion which is provided in the rod and engages with the elastic nail, and

wherein the erection wall is formed with a pair of slits, and the elastic nail is formed in the erection wall in a bendable manner through the pair of slits.

18. The lock device for the opening and closing body according to claim **17**, wherein when viewed from the direction perpendicular to the bottom surface of the base member, a width of the erection wall is less than a width of the bottom surface of the base member and a width of the elastic nail is less than a width of the erection wall.

19. A lock device for an opening and closing body that is attached to an opening portion of a fixed body so as to be openable and closable, the lock device comprising:

lock portions provided on one of the opening portion of the fixed body and the opening and closing body;

a pair of rods which are provided on the other of the fixed body and the opening and closing body and are to engage with or disengage from the respective lock portions;

a base member installed on the fixed body or the opening and closing body;

a rotary member which is attached to the base member rotatably; and

a manipulation member to manipulate the rods to engage or disengage the rods with or from the respective lock portions,

wherein the base member has a bottom portion which faces an installation surface of the fixed body or the opening and closing body and has a bottom surface and a pair of erection walls which are erected from the side of the bottom surface,

wherein the rotary member has a rod link portion which is coupled with the rods and transmit rotational power of the rotary member to the rods and a guide wall which is located inside the rod link portion in the rotary member and guides the rods as they slide, and the guide wall comprises arc walls or a cylindrical wall having arc-shaped surfaces or a circular surface whose axis coincides with the rotation center of the rotary member,

wherein when viewed from a direction perpendicular to the bottom surface of the base member, each erection wall of the base member and the guide wall of the rotary member are opposed to each other with a gap capable of receiving the associated rod formed in between,

wherein coming-off-preventive structures each of which prevents the associated rod from coming off in the direction perpendicular to the bottom surface of the base member when the rod is inserted in the gap and coupled with the rod link portion is provided between the rod and the associated erection wall of the base member,

wherein each coming-off-preventive structure comprises a bendable, elastic nail which is provided in the erection wall and an engagement target portion which is provided in the rod and engages with the elastic nail, and the elastic nail is thrilled into a shape having a base portion disposed at a side of a tip portion of the erection wall in an erection direction thereof and a free end extending from the base portion toward the bottom surface of the base member,

wherein a side surface, opposite to a side surface located on the side of the guide wall of the base member, of the rod is formed with the engagement target portion,

wherein the engagement target portion is a projection strip which extends in the axial direction of the rod and is formed in the side surface, opposite to the side surface located on the side of the guide wall of the base member, of the rod at a position close to the bottom surface of the base member, and

wherein the elastic nail has an engagement surface which engages with an upper surface of the projection strip to prevent the rod from corning-off, and the elastic nail engages with the engagement target portion in such a state that a tip of the free end of the elastic nail urges a side surface of the projection strip so that the rod comes into contact with the guide wall.

* * * * *